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THE Indian Government has arranged with the Madras Railway Company to have passed students of the Madras College of Engineering admitted to the company's shops for two years' training in mechanical engineering, the fees to be 500 rupees per year. Government pays half of this premium for *one* student each year. Other passed students are received at Public Works shops for post-graduate training free. An arrangement of this kind would hardly open a flattering prospect to the young men of the schools of mechanical engineering in this country, but it is accepted as a liberal concession in India, as in the mother country. Here, graduates of the technical schools are eagerly picked up by managers of shops, and given a salary of some sort from the start, and do not need to be youthful capitalists to get a foothold in the profession. It would appear that mechanical engineering is not likely to become an overcrowded pursuit in India.

THE NEW CROTON AQUEDUCT.

The new Croton aqueduct was formally, though with no great ceremony, opened on Tuesday. A few officials, reporters and casual visitors witnessed the turning on of the water into the Central Park reservoir; but there were no speech-making, firing of cannon, or brass bands to mark what really was a very important event. It is characteristic of the times that this event, the nominal completion of the greatest engineering work of its kind, hardly caused a ripple of exeitement. People are becoming so used to vast engineering achievements that their appreciation seems to have palled, and few appear to grasp the full significance of this particular one. Perhaps the new aqueduct would be more popular had its history not been clouded by the scandals about the workmanship and costs of portions of it and the delays and repairs made necessary by the bad faith of contractors.

The old aqueduct has a capacity of about 90,000,000 gallons in 24 hours; the new one about 310,000,000 gallons. New York City will therefore be generously supplied with water, and a liberal margin for increased consumption per capita will be available for many years to come. Even with the former supply, the average consumption by each inhabitant was by no means niggardly, though in exceptional seasons the supply has run short. But now, barring improbable accidents, New York will be abundantly provided for.

The greater part (30¼ miles) of the new aqueduct is a tunnel in solid rock, often at considerable depth from the surface. Where it crosses the Harlem, it becomes an inverted siphon, reaching a depth of 300 feet to obtain secure ground. Its cost, with the accessories of dams, reservoirs, weirs, etc., will be over $23,500,000; but the use of power drills, high explosives and other improved means has enabled the work to be done much more cheaply than would have been possible a generation ago, notwithstanding all shortcomings and errors.

After the Central Park reservoir has been filled, the flow of water will be shut off for a time, and both the reservoir and the aqueduct will be tested for leaks, and such repairs as are found needful will be made. Considerable work remains to be done before the whole system of water supply and distribution is perfected; but at last it looks as though the end were really in sight.

ANOTHER PROPOSED REVOLUTION IN STEAM NAVIGATION.

We have not heard for several months of the jet propulsion steamer which was announced nearly a year ago as being about to revolutionize steam navigation. While the deluded stockholders who are said to have invested many thousand dollars in this scheme, on the representations of the "promotor" who formed the "connecting link between the inventor and the capitalist," are still waiting for dividends, another inventor has appeared who proposes to occupy the field in a way not less remarkable.

According to an article in the daily press, a new steam launch is to be tried on Saturday of this week on the Harlem River, containing a new quadruple expansion gas engine, the invention of Capt. ARCHIBALD WATT, of the schooner yacht "Osprey." It is erroneously stated that this is the first quadruple expansion engine ever built. The cylinders stand one above the other, and are 4, 5, 6 and 8 inches diameter. The gas is generated by boiling oil in a kind of retort. Seven oils are mixed together; one of them is kerosene, but the Captain will not tell what the others are. The gas, after it has passed through the engine, "being too hot for use as fuel" (?) is drawn off into a pipe running alongside the keel of the boat, where it is condensed. The resulting oil is returned to the fire-box and consumed as fuel. This is smokeless, so that, except for a few minutes before the start, the engine is run without smoke. The launch is only 16 feet 4 inches long. The Captain says he can develop 12 H. P. with his engine, and thinks he can make the launch go over six, and possibly ten miles per hour. He says he can build an engine like this on any scale, and if it realizes his expectations it will make possible a much higher rate of speed than has yet been developed by any steam vessel.

If we rightly understand the description, the gas formed by boiling the oil in the retort acts upon the pistons of the engine merely by its boiler pressure, the same as does the steam in a steam engine, and not by the pressure generated by its combustion with air, as in a gas engine. The engine is, therefore, not a gas engine in the ordinary sense of that term, but a vapor engine. If the gas exhausted from the engine is "too hot for use as fuel," there must be an enormous waste of heat in condensing it into oil again in the pipe running alongside of the keel. When this condensed oil is then burned under the retort, to vaporize another quantity of oil at a high temperature, there must be a further and very serious waste of heat in the waste products of this combustion. We cannot see how it is possible to get even as much efficiency out of this device as out of an ordinary petroleum or naphtha engine, and we fear that the Captain, like hundreds of other inventors who have experimented in the same direction, is doomed to disappointment.

THE NEW SILVER ACT.

The enactment of the new "silver law" has probably settled for the present the agitation of the silver question—we gave the text of the Act in our issue of last week.

This measure, though we believe it a mischievous one in many respects, is still much less harmful than the measure recently passed by the Senate, or than the free coinage measure asked for by many of the members of both political parties. It will not so quickly drive gold out of the country.

The Secretary of the Treasury having the option of redeeming these bullion notes in silver, and since he also determines what "the market price" of silver is, and is instructed to buy only so much of 4,500,000 ounces of bullion as may be offered each month, it rests with him practically to determine how much silver shall be purchased each month. We believe it is a mistake to leave so much to the discretion of any one officer of the Government, though in this case the Secretary no doubt understands the matter better and will act with greater wisdom than either the Senators or Congressmen have shown.

The effect of the law will altogether depend on the "discretion" of the Secretary. If he allows the market to be put up on him and pays the artificial prices, he will get 4,500,000 ounces each month, either of domestic or foreign bullion, and the price will quickly rise to $1.29 per ounce, but if the actual and natural market price only be paid, then the quantity will not reach 4,500,000 ounces, and the price will probably remain considerably below $1.29 per ounce in gold. Since the bullion is to be paid for with notes which are to be redeemed with silver dollars coined from the bullion so purchased, there is no necessary comparison with the price of gold.

It may very easily occur that silver bullion will command a price of $1.29 an ounce, payable in silver dollars or their equivalent notes, while gold might be at a high premium.

We see no reason to change our opinion that so long as gold can be obtained at 1 to 16 for silver dollars, there will be a large amount of foreign silver sent here and gold taken away. Moreover, the fear that we will soon get down to the single silver basis will so alarm foreign holders of our securities that these will be sent back and converted into gold.

The measure will, in our opinion, injure rather than help the cause of bi-metalism, and, we believe, will injure this country, for it is all but certain that the taxpayers will not continue indefinitely to pay out $60,000,000 or $70,000,000 a year for silver that is not needed, and when they cease to do so the price of silver will go lower than ever before.

As a measure for producing inflation of values it will no doubt be effective, and still the country will have something for its outlay unlike the shameful expenditures for unearned and undeserved pensions.

The effect of inflation is of course to advance or mark up prices of nearly everything, and while the inflation is going on people think they are growing rich. When the inevitable reaction comes we shall have a repetition of the long period of depression and disastrous times that followed the inflation due to the extravagant expenditures of the war.

Inflation is not prosperity, and those who advocated this silver bill in order to mark up values have not been the friends of American industries, and especially of American workmen. The capitalist can take care of himself, whatever the law may be, and he will turn to his advantage this new inducement for men to run in debt. The poor man is the one who always suffers from financial revolutions, and he it is who now will be the loser.

However, the law has been passed, and while we believe it to be unwise and hurtful, yet while it is the law it should be fairly executed. When its bad features have been shown in practice no doubt it will be changed, though at a heavy loss to the country. It is not a little comforting to think how much worse would have been the case had free coinage or some of the other proposed measures been enacted.

CO-OPERATIVE MINE MANAGEMENT.

When several mines in the same district or situated within reasonable distance of each other are in need of expert professional services, it often happens that an arrangement can be made by which the different mining companies or private owners may secure the advantage of high class service by jointly paying the salaries which such work calls for. Thus consulting engineers are often employed by several companies, each of which assumes a share of the expense, in this way lowering the charge to each, while in the aggregate paying fair rates to the engineer. For this kind of service it is seldom that any one mine or metallurgical works requires the entire attention, time and personal presence of a consulting engineer. Periodic visits for inspection and emergency trips are usually sufficient, and an active man finds it quite possible to attend to a variety of duties and divide up his time so as to be constantly occupied without running behind in any one part of his work. The plan is a good one for both sides. Companies which would hesitate at the expense of employing high-priced men, secure economically all the attention they need, and do not have to do without it or (what is often worse) content themselves with inferior service. Cheap profession a labor is of doubtful value, often actually detrimental. In engineering, a man generally finds his level, and his value is approximately measurable by the pay he commands. On the side of the engineer, the system is equally advantageous. More and steadier occupation is the result, and so far from restricting the openings for employment, the field is widened and there is room for more men.

So far we have merely touched upon a common practice, the advantages of which are well recognized. But the system has been shown to be capable of considerable extension, though the instances are not very numerous in which the co-operative plan has been introduced in other branches of professional work than that of the consulting engineer. Take the case of a group of mines, great or small, or of both kinds (as is the rule in most districts), each of which is in need of the best technical work, but perhaps cannot individually afford to pay for it. By combining, they can establish a joint assay office having better facilities for making prompt reports and for melting bullion than one operating on a smaller scale. As the result, more frequent and systematic sampling is possible in the mines, and check assays are increased, the mine officers not being hampered by a penny-wise economy in ordering samples for assay. While the equipment of such a combination assay office is more perfect, many labor-saving appliances, such as power crushers, etc., being admissable, and various working-test apparatus being added, the proportionate expense is reduced. This is true also of mine surveying and mapping, designing of surface improvements and mechanical details. By the adoption of the co-operative plan the mines cheaply get the benefit of the best skill, and assayers, surveyors, draughtsmen and their assistants need have no fear that any crowding out would ensue. On the contrary, there would be work for more of them.

To put the whole matter concisely, it amounts to just this: Every mine and every works, big or little, *ought* to have the very best services, and the most efficient appliances, in order to reach the best technical results. But, in point of fact, it is only the great mines and works that can stand the expense. By "great" we mean largely productive enterprises, and will include also those non-dividend ones which are backed by free-handed assessment payers. If several neighboring mines are owned or controlled by the same financial management, it is not difficult to effect such an arrangement; and it is in such cases that we find the system most frequently exemplified. But it might well be further adopted. Few mines can carry a force of expert specialists on their pay rolls if they attempt to do so individually.

The custom is to require too much from the superintendent of a small mine. He is expected to be his own mine captain, surveyor, draughtsman, assayer and general utility man, besides looking out for all the mill and shop work, making contracts, employing labor, buying supplies and attending to all the multifarious odd details which belong to small mines as well as big ones. He would be a paragon of an engineer who could do each one of these several things to the best advantage. For the best results his mind and his time should be left free for the *mining* proper and the general supervision. And this is possible if, by the adoption of the co-operative system a part of the drudgery which can be done just as well or better by others is taken off his hands.

PLURAL TESTS.

It is often said that the purchaser of iron or steel cannot logically specify its composition and at the same time its physical properties. To do this may be inexpedient, unwise; but unless the tests are mutually exclusive, it is not necessarily illogical.

In purchasing other things we may and often do insist on tests of two or more radically different kinds: and, provided that our demands are not mutually exclusive, we are called cautious or timid, foolish or sensible, as the case may be, but not illogical. We may reasonably insist that a horse shall trot within three minutes, and shall be less than four years old, and shall be sound and kind, etc. We may specify that a clerk shall understand bookkeeping, and shall have had a certain term of experience, and shall give certain bonds, and shall be of a certain nationality, and shall have hair of a certain color. Here the second and third specifications are simply safeguards in addition to the first, and sensible; the fourth probably due to some race prejudice, and inexpedient; the fifth due to some whim, and simply silly and vexing, but hardly illogical. If, however, we specify that the horse shall weigh not less than a ton *and* shall trot within two and a half minutes, we become illogical, because our conditions are practically mutually exclusive.

Now in testing iron and steel, as in much other testing, we usually have no direct means of ascertaining whether the material tested has the properties which we call on it to exhibit in use. Our testing, therefore, has to be roundabout. We infer from the color of a certain cloth that it will not fade, from its feel that it will wear. These are both indirect tests however. The direct test would be to subject it to the sun and to wear. But this is inconvenient: hence we submit the cloth to indirect tests, such as looking at its color, feeling its texture. From the qualities which we detect in it by direct observation, namely a certain look, a certain feel

we infer certain other qualities, to wit: tendency to fade and resistance to abrasion. Certain qualities are observed in order that certain other qualities may be inferred; but it is here, and indeed usually, the inferred, not the directly observed, qualties that are important.

If we know one convenient test, detecting certain qualities, from which the qualities sought may be very safely inferred, the observed and inferred qualities here standing in close relation, such a single test may well suffice. But when the best test that we can devise simply enables us to observe certain properties which are not closely related to the property sought, so that the latter may not be very safely inferred from the former, it may be well to devise several independent tests, each enabling us to observe a different property of the object tested, so that we may infer in several different ways, and from several different premises, to what degree it possesses the property sought. And the less direct the connection between the quality observed in our test and the property sought and inferred therefrom, and the more important the use of the object, the more desirable is it, other conditions being equal, to devise plural tests. From the flavor of a cigar we may infer its taste safely; the connection is close; the inference safe; a single test suffices. Smell, indeed, may be held to be merely taste in the nose.

In case of iron and steel, however, it is quite different. We cannot, in general, readily apply to a sample of the metal tests which will tell us directly how far it possesses the properties which it will need in actual use. A rail is to resist both heavy grinding and indefinitely repeated pounding. Steel for boilers must endure much distortion in the cold and at a blue heat in its preparation, and endlessly repeated straining and bending in use, as the boiler, heating and cooling, expands and contracts irregularly.

It is true that our tensile tests, and better still, if combined with bending tests, give us some ground for judging whether a given sample will endure the conditions to which it is exposed in use; but they give us no direct evidence. The qualities brought out by the test, to wit: resistance to and elongation under a gradually applied load, resistance to a few blows at the ordinary temperature, etc., differ materially from those which the rail or the boiler-plate must exhibit in use. To insist that the composition of the steel shall lie within certain limits, is, then, an additional safeguard. A certain good composition is an additional premise from which we may infer that the metal is fit for its proposed use.

It then becomes a question, not whether it is illogical to insist on a given composition, but whether it is expedient, and whether the composition is wisely chosen; whether the properties which the metal must possess to endure the conditions of use are so closely related to those exhibited in testing that we may safely infer the one from the other, without the additional guarantee of good composition. Now it seems to us that, in cases of the first importance, and where the conditions of use differ greatly from those of testing, our knowledge of the relation between the different properties of iron and steel is still sufficiently imperfect to justify specifying composition as well as tensile tests. In the case of guns we are confident that this is true; in that of boilers we believe that it is.

If the merits of a gun are to be judged by testing its mate to destruction, chemical analysis may be superfluous: but then so may tensile tests. If, however, the metal for the gun is to be judged by common static tensile tests, the connection between these and the test it will be put to in warfare seems to us remote enough, and the importance of the case great enough to justify a chemical as well as a physical specification.

In the case of boilers, we note that the American Boiler Manufacturers' Association unanimously adopted a recommendation, that there should not be more than 0·04 per cent. of phosphorus, nor more than 0·03 per cent. of sulphur, in good boiler-plate steel, leaving the proportion of carbon and manganese to the discretion of the steel-maker. It may be a question whether they have not put the limit for phosphorus rather low; but that they were quite reasonable in setting some limit for phosphorus we believe.

NEW PUBLICATIONS.

THIRTEEN YEARS OF TRAVEL AND EXPLORATION IN ALASKA. By W. H. PIERCE. Edited by Prof. and Mrs. J. H. Carruth, Lawrence, Kan. 1890. 12mo, 224 pp. Paper, 75 cents; cloth, $1.35.

A very vivid and realistic narrative of the experience of a prospector in Alaska, and especially in remote parts of the interior concerning which little information has been given. The book is written in a homely style, and the accounts of hardships and adventures are given in an unaffected manner which carries conviction of the writer's sincerity. The literary shortcomings of the work might provoke a smile if found in another kind of book, yet seem almost in keeping here.

Notwithstanding the author's trying experiences, he is still imbued with the mineral richness of the territory, and looks for great things from the undeveloped gold quartz veins of the interior when the country is opened up. In his trips the river placers alone received attention, and at the time only such lodes as were on the coast were being worked.

HISTORY OF EDUCATION IN ALABAMA, 1702-1889. Bulletin No. 8, Bureau of Education. By WILLIS G. CLARK. Government Printing Office, Washington, 1889. Paper, 8vo, 281 pp. Illustrated.

Even more promising than the material development of the "new South" is the great attention being paid to education in the Southern States. Those who are not familiar with recent progress in this direction will be surprised, on looking through this bulletin, to find how much is now being done in Alabama to afford facilities for the training of its youth. Besides the State University, colleges, private academies, normal schools, high schools, public grammar schools, sectarian institutions, etc., there is the excellent Agricultural and Mechanical College at Auburn, with its industrial department, the machinery for which is driven by engines made by the students in mechanics. The State model farm and experiment station are at the same place, and a meteorological branch is maintained. A woodwork department, foundry and shops for working in metals are also connected with the college, where students are taught the use of tools, cabinet and joiner work, and casting, welding and manipulation of iron and steel. The photo-engravings in this report illustrate some fine educational buildings and interiors of laboratories. The great part of the progress has been made within comparatively few years.

PRACTICAL SANITARY AND ECONOMIC COOKING; ADAPTED TO PERSONS OF MODERATE AND SMALL MEANS. By Mrs. MARY H. ABEL. Lomb Prize Essay. Published by the American Public Health Association, Rochester, N.Y., 1890. 12mo, 182 pp. Cloth, 40 cents; paper, 35 cents.

For a book ostensibly published in the interest of "sanitary cooking," and which was awarded the prize of a public health association, this is a curiosity. There are in it many sensible hints, but these are overweighted and almost buried out of sight by the mass of recommendations inciting to indigestion, domestic feuds, and general moral degradation. We suppose that our native American cuisine is about the worst existing among peoples claiming to be civilized. Dyspepsia is one of the typical national diseases, the ailment being a necessary consequence of the aliment. It is true that recent American books on cookery show progress upon the older ones, and this particular book is not nearly so bad as the general run; but there is plenty of room yet for improvement. Now that Americans are becoming more cosmopolitan, travel more, meet more foreigners here, and have a better idea of how the rest of the world feeds itself, we are beginning to display better taste and less provincialism; and some of the cooking schools are doing considerable work in the line of reformation; but the change is a slow one. All the traditions are against it. There is a deeply rooted popular theory that French and Italian cookery mean highly seasoned and indigestible mysteries, and that the orthodox thing is "plain cooking"—which, being translated, stands too often for execrable abuse of good material.

A discriminating housewife may be able to select the useful portions of this book and disregard the rest, and, as already intimated, it is better than many other cookery books; but she will need to observe an attitude of conscientious and firm resistance to the constantly recurring temptations to criminal offenses.

ELECTRICITY IN MODERN LIFE. By G. W. DE TUNZELMANN. Published by Scribner & Welford, New York, 1890. Cloth, 12mo., 272 pp.; illustrated. Price, $1.25.

Professor Tunzelmann's book is one of a numerous and useful class which has come in vogue of late years. It aims at popularizing scientific knowledge without descending into puerility. Its most difficult task is to cover the ground and preserve a balance between the sub-topics discussed, without becoming too bulky for popular reading. This is accomplished as well as in most books of its kind. In the preface the author says: "It [the book] is addressed primarily to readers who have no previous knowledge of the subject, but who wish to know something of what electricity has been made to do for us, and of how it has been made to do it." He trusts, however, "that it may also be of some use to students who are just beginning the study of practical electricity, by giving them a general view of the field of knowledge which they will afterwards have to study in detail."

In reading a book on electricity, about the first thing one looks for is the author's definition. This gives an index of his method of thought. In recent publications we have had a variety of definitions of electricity, and the more cautiously they are put the safer they are, in the present knowledge of the subject. One writer calls it a "condition," which does not tell us much; another says, "we do not know what it is." Professor Tunzelmann himself writes: "We are justified in concluding that whatever electricity is, it behaves exactly as if it were an incompressible fluid."

The style is easy and clear, and the whole book is readable. There is a difference of opinion as to conflicting claims for priority of discovery and invention, and adverse criticism might be provoked on some of the statements; but then it is impossible to suit everybody when touching these delicate points, and the author has evidently sought to be fair.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price! These notices do not supersede review in the Journal.]

Bureau of Education—The History of Federal and State Aid to Higher Education, in the United States. By Frank W. Blackmar, Ph. D. Published by the Government, Washington, D. C., 1890. Pages 343.

Bureau of Education—History of Education in Alabama. 1702–1889. By Willis G. Clark. Published by the Government, Washington, D. C., 1890. Pages 281. Illustrated.

Bureau of Education—English-Eskimo and Eskimo-English Vocabularies, Compiled by Ensign Roger Wells, Jr., U. S. N., and Interpreter John W. Kelly. Published by the Government, Washington, D. C., 1890. Pages 72.

Catalogue of Minerals for sale by Geo. L. English & Co., Philadelphia and New York. 8 vo., 100 pp., with crystallographic diagrams. Paper covers, free on application; cloth, 25 cents. This catalogue, though issued as a trade list, contains much information of value to students of mineralogy and to collectors.

Geological Survey of New Jersey. Report of the State Geologist. Vol. II., Mineralogy, Botany, Zoology. Published by the State, Trenton, N. J., 1889. Pages 630.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Losiel Pulverizer and Amalgamator.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Can you inform me where I can get prices and information of Losiel or Lochiel pulverizer and amalgamator? ENQUIRER.

[Perhaps some one of our readers can give the desired information; we do not remember to have heard of such a machine. ED. E. & M. J.]

Darby's Recarburizing Process.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. Darby's statement to me that all but 15 per cent. of the carbon added was accounted for by the carbon in the steel, was made without any reservation, and after communicating the results of analyses showing as much as 0·91 per cent. of carbon. Mr. Elbers cannot escape from the difficulty by taking the cases which favor and ignoring those which oppose his theory.

Passing by the fact that perfectly reduced iron sponge, when exposed to a current of carbonic oxide, later gave up 0·84 per cent. of oxygen to a stream of hydrogen, the further fact that a rapid stream of carbonic oxide turned iron wire blue and straw color would seem to indicate that gas can oxidize metallic iron. Yet Mr. Elbers does not think that this is even evidence in favor of this proposition. H. M. HOWE.

HOOSICK FALLS, July 15, 1890.

The Cook Amalgamator.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Since replying to John H. Paddock's letter upon the Cook Amalgamator, which appeared in your issue of July 5th, I have obtained from Washington, D. C, a copy of the patent and specifications of the Coleman Ore Washer, patented February 7, 1871, by Charles C. Coleman, of San Francisco, Cal. I am no longer surprised that this patent did not come to light during all the searches made before the six patents were allowed upon the Cook Amalgamator, but I am greatly astonished that Mr. Paddock should have written so positively upon a subject with which he is obviously unacquainted. The Coleman machine is an ore washer,

Fig. 1.

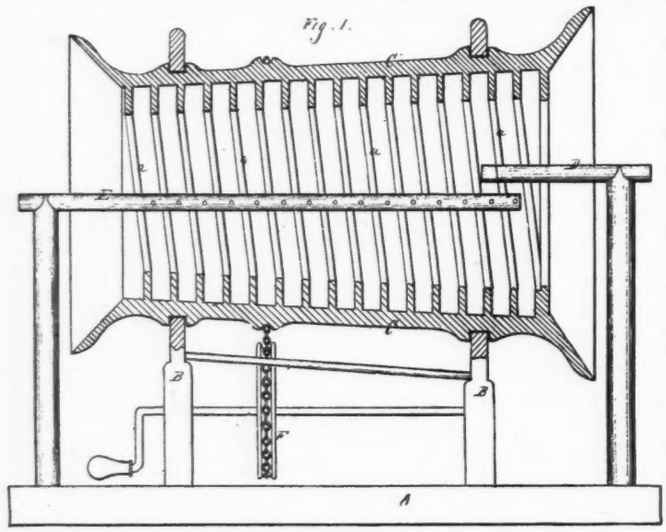
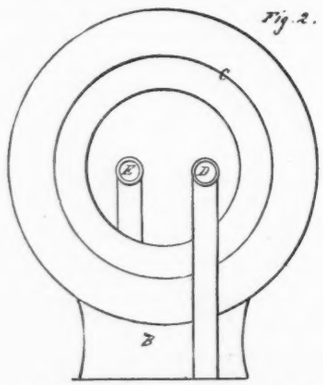


Fig. 2.



IMPROVEMENT IN APPARATUS FOR CLEANING SULPHURETS AND OTHER ORES. PATENT NO. 111,612.

pure and simple; it is so designated upon the specifications of patent, and nothing more is claimed for it. The Cook Amalgamator is different in principle, different in action, and for a distinctly different purpose. A clock has a round face and indicating hands, so also has a mariner's compass, but they are widely different instruments, although of greater similarity than the Coleman Ore Washer and the Cook Amalgamator.

Mr. Paddock has been led into error by a lack of knowledge of the principles governing two distinct operations in the process of mining, ore washing and gold amalgamation.

I enclose herewith a copy of the patent referred to, and beg leave to apologize for troubling you with a subject which presents no one single point upon which to hang a discussion. HENRY COOK.

CAMDEN, N. J., July 15th, 1890.

[We have examined the copy of the patent and there is no question whatever that the claims of the earlier (Coleman) patent do not at all cover the ground aimed at by the latter. The Coleman machine is an ore separator or concentrator pure and simple, while the Cook machine is an amalgamator, and depends upon the use and application of quicksilver. That the owner of a Coleman machine should, on looking at the drawing of a Cook amalgamator, think it was his old friend under a new name, is not astonishing. The sort of family resemblance is so strong that we have reproduced here the patent drawing of the Coleman machine.—ED. ENGINEERING AND MINING JOURNAL.]

Copper Assays, Etc.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: An article on "The Volumetric Analysis of Copper" in your issue of May 31st, interested me particularly for two reasons; firstly, because it describes an improvement in the volumetric assay of copper by the potassium cyanide process which, as heretofore performed, required a number of precautions, without which it could not be relied on as accurate, and, secondly, because it says, "We cannot estimate copper accurately by any rapid method." I do not know exactly what is meant by "rapid method," but, as the writer of the article alludes to "the electrolytic method, which is perfect" as requiring "some time," and as that time is, according to what I have read, from two or three hours to "all night," it may be that a method which occupies from ten to twenty minutes may be included, and even one which takes an hour may not be very far outside the pale.

I have found my two methods of determining copper by means of potassium xanthate as accurate as electrolysis and much more rapid; moreover they are not interfered with by substances which tend to interfere with the electrolytic process. I have never used the eletrolytic method, but have had comparative assays made in that way by a friend who is an extremely careful operator.

The first of these methods is volumetric, and is fully described in my book on assaying, also, in the *Mining and Scientific Press* of San Francisco, though, I regret to say, I cannot give the exact date; it was probably in 1884. I operate on an ammoniacal cupric solution in this method.

My second process is gravimetric. For this a cupric solution is not suitable, because of the formation of an oily substance which remains entangled in the p. p. and which, while it is not entirely stable in the drying at 100 degrees C., I have found it impossible to get rid of, even by washing with alcohol, in which it is soluble, or by dissolving the cuprous xanthate in aqueous potassium cyanide, in which the oily matter is insoluble. In the latter case, a part of the cuprous xanthate is retained by the oil, and in the former a portion of the oil remains with the p. p. It would therefore be necessary to calcine the p. p. to convert it into cupric oxide for the weighing. This difficulty is avoided by operating on a cuprous solution. This oily substance seems to be identical with that produced by iodine in solution of potassium xanthate, the formula of which, according to Watt's Dictionary is $[C_4H_5OC_2(S_4O)]$ where O = 8.

Roscoe and Schorlemer give to cuprous xanthate the formula $(C_2H_5COS_2)^2Cu_2$ (O=16); accordingly it contains 34·854 per cent. of copper (Cu=64·4).

My results by this method are almost absolutely accurate, operating on extremely complex (artificial) mixtures of substances; taking 155·1 of pure copper I recovered 155·08.

The method is not given in my book, because I had not perfected it when the book was written. The gravimetric process given in the book is imperfect, because a cupric solution is used. At that time I supposed the copper xanthate to be a basic cupric salt, and the oily substance to be free xanthic acid. Such a salt would contain very close to 33 per cent. of copper, and I got that percentage by washing the p. p. with alcohol.

The perfected process, in the absence of cobalt, was published in the *Mining and Scientific Press*, January 19th, 1889, but as I have since found a way of avoiding the difficulty in regard to cobalt, I may perhaps venture to repeat the description, with that amendment, here.

Taking a suitable quantity of the substance, I digest it in the usual manner in a mixture of nitric, hydrochloric and sulphuric acids, which, if done in a porcelain dish with an inverted funnel as a cover, takes not more than fifteen minutes. I then cool, dilute and filter. To the filtrate I add ammonia in excess, again filter, and, if there is much iron, redissolve and repeat the precipitation. The solution is now free from silver, lead, antimony, tin, bismuth, barium, strontium and iron. Zinc, cadmium, manganese, chromium, arsenic, alumina, lime, magnesia do not interfere, though it is as well to add with the ammonia some ammonium carbonate if manganese is present.

I acidulate the solution slightly by sulphuric or hydrochloric acid, and add, first sodium sulphite in crystals, and then sodium thiosulphate, also in crystals, till it is quite clear, and, in the absence of chromium, colorless. If chromium is present the liquid will be green. If cadmium is present there may be a white p. p. of cadmium sulphide, but this redissolves in the sodium thiosulphate. I have now a purely cuprous solution, not easy to get by other compatible means, and on adding a moderately strong solution of potassium xanthate (aqueous) the copper is completely precipitated.

The p. p. I prefer to wash with alcohol, after water, and then it dries very quickly. It is weighed on the counterpoised filter after drying at 100 degrees C.

If nickel and cobalt are present they go down with the copper. The former is easily removed by washing the still wet p. p. with ammonia as long as the drips give a yellow p. p. with acetic acid, and it may be recovered and determined, at least approximately, by adding acetic acid in slight excess, and a drop or two of the potassium xanthate solution to the liquid, collecting the reprecipitated nickel xanthate and drying it on the water bath. The p. p contains 19·6 per cent. of nickel. I separate the cobalt xanthate by washing the mixed p. p. of copper and cobalt with aqueous solution of potassium cyanide in which the former is soluble, the latter not. The cobalt xanthate remaining on the filter is washed first with water and lastly, to facilitate drying, with ammonia; it contains 19·6 per cent. of cobalt. I now add acetic acid in slight excess and a drop of

potassium xanthate solution to the solution containing the copper, which is thereby completely reprecipitated as cuprous xanthate and, after washing with water (all the water used should be rather hot, but not boiling), and, if convenient, with alcohol, is determined as before said.

If the copper solution in the first place was allowed to retain a trace of cupric salt, for lack of a sufficiency of sodium thiosulphate, a little of the oily matter will be produced and will remain with the cobalt on the filter. If there is any question of this, the cobalt p. p. may be calcined, converted to sulphate and determined in that form. If the nickel is not completely removed by ammonia, that which remains will be dissolved by the potassium cyanide, but will not be reprecipitated by acetic acid.

The behavior of cadmium induced me to experiment on its separation from zinc, which I find is effected in the acetate solution by sodium sulphite, the cadmium being precipitated, the zinc not. Salts of ammonium must be absent.

Solution of potassium xanthate remains good for several weeks in opaque bottles, at least for this purpose, as a slight alkalinity which is apt to supervene is not injurious in the assay of copper by either of my methods; the crystals are quite permanent. C. H. AARON.

SANTA LUCIA, Honduras, June 23d, 1890.

THE PERUVIAN GOLD REGIONS.

Written for the Engineering and Mining Journal by Fred. Edmunds.

The following is the first of a series of three or four articles we shall publish. It shows the formations, and geologists and miners will note the wide and variable character of the geological and mineral formations of Peru.

On the coast the hills and ranges are almost exclusively formed of crystalline rocks, and gold is found in the quartz lodes which run through granite and syenite rocks. The proportion of oxide of iron accompanying the auriferous quartz varies very much, so that all classes of ores are encountered, from white quartz, bearing stains of iron, to a rosy rock so charged with the oxide of iron that this metal almost forms the gold bearing lode, and very little quartz is observable. The gold bearing lodes vary very much in their features. Some are prismatic crystals or in semi-crystalline grains joined together by the oxide of iron, or in amorphous masses of a more or less compact form, or sometimes, spongy and lava like.

In the coast region it is not unusual to find the auriferous quartz blended with other metal bearing lodes, such as white talcose, very soft to the touch, and with a silky silvery appearance, and carrying traces of carbonate of lime and limonite. Finally, it may be added that on the coast of Peru pure gold is found in the copper mines, in which a number of different ores are found.

In the mountain regions sedimentary rocks are found, and there gold lodes are found not only in the crystalline earth formations, but in the metamorphic rocks. Gold is found in these regions in a pure state, and also mixed with pyrites or sulphurets of iron, accompanying other metallic sulphurets containing more or less silver.

Free gold is also found in the mountains and plains of the interior, and it can be obtained by washing, which is a practice which produces no results on the coast.

In the Eastern Cordillera, and in the northern region, which is known as the Montaña, gold is commonly found in lodes of quartz running through talcose and sandy slate formations. The gold-bearing quartz in this region is generally white, and even if stained by oxide of iron, these stains are never so abundant as in the mineral rocks of the coast. The quartz in this region, and particularly that from Sandia, occasionally contains arsenical pyrites. In this part of Peru large gold-bearing alluvial deposits are to be found, and from them the largest nuggets have been obtained.

A brief description of the different regions of Peru in which gold has been found may prove of interest, and they are given in geographical rotation, commencing from the Northern Departments and running down to the South.

In the Department of Loreto, in the Province of Alto Amazonas, many alluvial washings are found between the Pongo de Mansenche and the mouth of the Huallaga River. These washings were worked for two centuries, but they were finally abandoned, due to the continuous attacks of the savages and in 1857 the villages near Barranca and San Antonio were destroyed.

In 1867 the Peruvian naval captain, Don Manano A Vargas, was exploring in that district in a steamboat, and at a place called Hunlica he saw his Indians obtain good results with a very crude system of working. Since then others have gone to work in that district.

The river Napo, which rises in Ecuador, brings down quantities of gold, and the Indians, by washing with wooden basins, obtain grains and dust.

The Sto. Tomas gold mines, in the department of Amazonas, are situated in the Province of Luya. These mines are situated six miles from the town of Sto. Tomas and fifteen miles to the south of the city of Chachapujas. The gold-bearing hills are called San José and Chururco, and the main mine is known by the latter name. The lode in this mine is about 800 meters in length, and it varies between 3 and 24 centimeters in width. Another lode is called Hora Buena, and the lode in it is from 30 to 50 centimeters in width. The gold is found in quartz bearing oxide of iron and pyrites. Some of this quartz has yielded as much as four ounces of gold to the ton. The quartz is extremely varied in character, and some of the ore is easily treated, while some is of an extremely refractory character. Some of the rocks are so soft when exposed that they fracture when pressed between the hands, and on examination prove to consist of a heterogeneous mass of oxides of iron and manganese with talcose slate and quartz.

At Hualcarumi in Puira, and nine miles from Ayahaca, wash gold is found among different classes of soil, and in quantities which would pay well to work under any modern system.

Near San Ignacio, almost on the frontier of Ecuador, wash gold has been found, but it is not worked owing to the lack of water.

At two leagues from Asuncion, in the province of Cajamanca, and at nine leagues from that city, the Capan gold mines are situated, and in them gold is found in quartz containing oxide of iron, with iron pyrites and magnetic iron. The pyrites I have assayed contain from 10 to 26 grammes of gold per ton, while the more compact rocks gave 41½ grammes to the metric ton. All through this region old workings are to be found.

In the Libertad Department and at about two miles from Huamachuco a hill called Taro is situated. This hill consists of fine sand lying in almost vertical lodes. Among this sand, talcose strata are found which bear the appearance of ashes, and which contain gold.

The province of Pataz, and principally the Southern portion of it, is rich in gold, which is found in a whitish rock looking like kaolin, and at the Parcoy mines, 13 leagues distant from the capital, rich returns in gold have been obtained. The gold generally is contained in paco, or oxide of iron, and which in some instances is so freely distributed among this soft substance that it can be worked out by simply washing. At the diggings at Tayahamha, in the province of Rataz, the Cajas River bed contains alluvial gold mixed with hematite. Here nuggets of pure gold have been obtained weighing five pounds, while pieces are frequently found weighing from one to two ounces. Many small streams run into the Cajas River, and all bring gold down with them, and among them the small Cajas River may be mentioned, which runs down at nine miles from Tayahamha from Pagrasha Hill, which is very high, and in which there are numerous lodes.

Gold has been found near Trujillo, and at 54 miles from that port at Zalpo, in the province of Otuzco, mines containing silver and gold are found. The richest mine in this region is the Pique de Zalpito, in which the gold is found mixed with chloride of silver limonite and oxide of manganese.

In these silver mines at Zalpo the gold occurs in a free state, and also mixed with sulphurets of silver and lead.

At six miles from Santa, and in a syenite formation, quartz lodes are found which have produced ten grammes of gold to the ton, although some specimens have yielded 40 grammes of gold to the metric ton.

STEEL RIVETS.

A paper by H. C. Torrance, read at the meeting of the American Boiler Manufacturers' Association, in New York, July 2, 1890, gives the following results of tests made by the U. S. Government of the shearing and tensile strength of 45 steel rivets. The rivets were driven hot, and the shearing tests made in single shear:

TENSILE TESTS.			SHEARING TESTS.			
Average diameter of specimen.	Average tensile strength per square inch.	Average elongation in eight inches.	Nominal diameter of rivet.	Average shearing strength per square inch.	Number of tests.	Shearing strength per cent. of tensile.
Inches.	Pounds.	Per cent.	Inches.	Pounds.		Per cent.
·624	51,660	31·12	⅝	41,800	9	81
·616	55,925	29·94	⅝	57,963	6	104*
·753	58,573	29·56	¾	47,983	6	82
·756	60,250	29·75	¾	52,248	6	87
·869	56,370	29·37	⅞	50,601	6	90
1·113	56,510	31·17	1⅛	57,177	6	101*
1·246	55,390	30·60	1¼	49,004	6	88

* These sets of rivets may have been hammered at a low heat, which would account for the abnormal results. Omitting these figures, the shearing strength averages 85·6 per cent. of the tensile strength.

The government requirements for the rivets used in boilers of the new cruisers are: The rivets for use in the longitudinal seams of boiler shells shall have from 58,000 to 67,000 pounds tensile strength, with an elongation of not less than 26 per cent. in 8 inches, and all others shall have a tensile strength of 50,000 to 58,000 pounds, with an elongation of not less than 30 per cent. They shall be capable of being flattened out cold under the hammer to a thickness of one-half the diameter, and of being flattened out hot to a thickness of one-third the diameter without showing cracks or flaws. The steel must be made by the open-hearth or Clapp-Griffiths process, and must not contain more than ·035 of one per cent. of phosphorus, nor more than ·04 of one per cent. of sulphur.

A lot of 20 successive tests of rivet steel of the low tensile strength quality and 12 tests of the higher tensile strength gave the following results:

	Low Steel.	Higher.
Tensile strength, pounds per square inch	51,230 to 54,100	59,100 to 61,850
Elastic limit, pounds per square inch	31,050 to 33,190	32,080 to 33,070
Elongation in 8 inches, per cent	30·5 to 35·25	28 5 to 31·75
Carbon, per cent	·11 to ·14	·16 to ·18
Phosphorus	·027 to ·029	·03
Sulphur	·033 to ·035	·033 to ·035

As the safest steel rivets are those of the lowest tensile strength, since they are the least liable to become hardened and fracture by hammering, or to break from repeated concussive and vibratory strains to which they are subjected in practice, the low tensile strength rivet should in general be specified for ordinary boiler work. For calculations of the strength of riveted joints, the tensile strength may be taken as the average of the figures above given, or 52,665 pounds, and the shearing strength, according to the table of shearing tests, may be taken at 85·6 per cent. of the tensile strength, or 45,081 pounds, in round figures, 45,000 pounds per square inch.

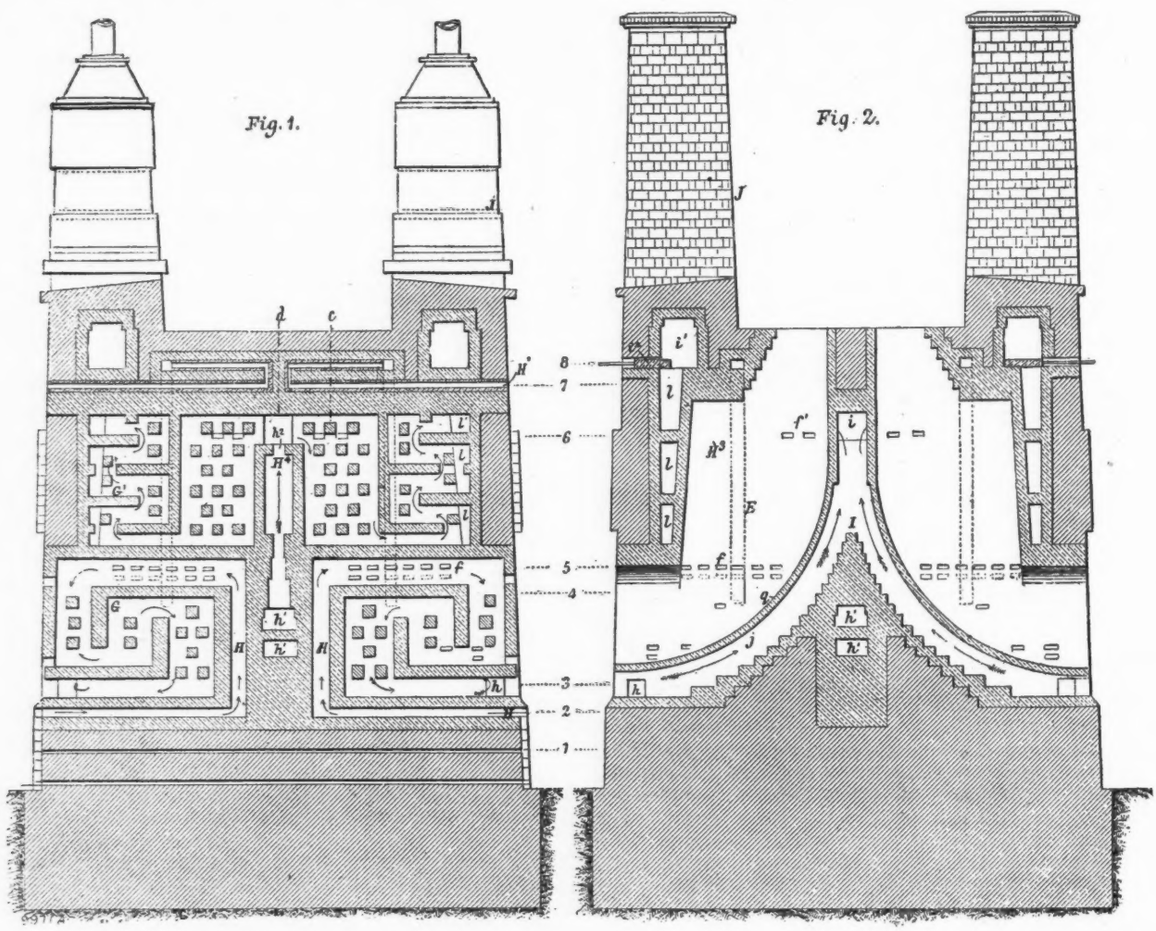
A New Asteroid.—A cable despatch from Kiel to Harvard College observatory announces the discovery by Charlois at Nice of an asteroid of the twelfth magnitude. Its position on July 15 at Greenwich midnight was: Right ascension, 21 hours 23 minutes; declination south, 13 degrees 40 minutes, with a daily motion of minus 7 minutes in right ascension and 5 minutes in declination.

THE BAUER COKE OVENS.

We take the following description and illustration from our contemporary *Engineering*, of the Bauer coke ovens, which seem to have given satisfactory results both in France and Scotland.

The main principle involved is the utilization of the otherwise waste gases and products, and it will be seen from the engravings that alternate coke and regenerator chambers are arranged side by side in a double row, while main flues for the combustion gases run along the tops of the chambers near the front, and discharge into chimneys placed in convenient positions.

The coking chamber *E*, Fig. 2, with its charging opening at the top, its carved back and base, and large discharge opening in front, communicates at the sides through openings *f f*¹, arranged at various heights, with the combustion chamber *G*, Fig. 4, where the gases are mixed with air admitted from the outside through passages *H*, see Fig. 1, forming a combustible gas of high heating power, which by way of passage *h* is conducted to the channel *j* below and along the back of the coking chamber, and then through *i* into the upper chambers G^1, heating by their combustion the upper part of the walls of the coking chamber *E* before they are discharged through the passages *l l* into the main flue i^1.



THE BAUER COKE OVENS.

The air before it mixes with the retort gases is heated by passing through long passages in contact with the heated walls, and the amount of air can be carefully regulated by slides. Additional air inlets with valves are provided near the top of the ovens at H^1 (Fig. 1), and the combustion gases can be also retarded in their flow to the chimney by valves at i^2. As will be seen, the illustrations are, respectively, Fig. 1 a cross-section through the combustion, and Fig. 2 through the coking chambers, Fig. 3 longitudinal elevations and sections on various lines marked in their respective places, and Fig. 4 a plan on different levels; in all these views the corresponding parts are marked with the same letters, and it is easy to trace out the courses of the gases and air through the various passages and chambers, ultimately discharging into the chimneys.

With this apparently somewhat complicated combination of coking chambers and combustion chambers, Dr. von Bauer obtains very good economical results, converting nearly the whole amount of fixed carbon into coke without apparently any waste. We are now enabled to give the result of some carefully conducted trials at the Carlton Iron Company's Works, where a plant of forty of these coke ovens was erected in 1888, giving satisfactory coke from all the various mixtures charged into them. With a view to obtain actual figures, special trials were made in April of this year, 124 tons of coal being used, of which 65 tons 16 hundredweight was washed East Howle coal, while 58 tons 4 hundredweight was unwashed coal obtained from various collieries, and while the former is a fairly good coking coal, the latter vary much in quality and contain a large amount of volatile matters. Samples of these coals were taken out of each barrow by the weighmen and carefully analyzed, and we have it on the authority of Mr. A. Stephenson, works manager of the Carlton Iron Company, Limited, that of a total fixed carbon and ashes of 69·65 per cent. in the coal, 69·44 was returned as coke, the time required for coking being 24 hours. The proportion of large to small coke was satisfactory, there being only about 6 tons of small in a total of 86 tons of coke obtained from 124 tons of coal. This proportion of small coke is, however, still considerably reduced, we are informed by the constructor, in all places where the traveling belt is used for the transit of the coke from the ovens to the trucks. It consists of an endless metallic chain, supported on rollers and so arranged that it travels slowly in front of the discharge opening of the ovens. When the door of a chamber is opened the coke runs, owing to the shape of the coking chamber, with but very little assistance from the attendant, on to the traveler, where it is quenched by water sprays, which can be regulated at will. The belt discharges the coke, practically without handling, into the trucks; thus a great saving of labor is effected, and we are informed that a foreman with three laborers can attend to a group of 40 ovens. With such good results obtained, it is little wonder that the works adopting these improved coke ovens are increasing, and we learn that Messrs. Merry & Cuninghame are now erecting 20 ovens at their Glengarnock works for the coking of Scotch coal. The experience so far gained certainly seems to show that, owing to the high temperature obtained in the regenerative flues by burning the gases with a suitable admixture of atmospheric air, coals of almost any composition can either by themselves or as mixtures be used to produce sound hard coke suitable for blast-furnace work, and since none but the volatile gases are utilized to produce the necessary heat, nearly the whole of the fixed carbon is converted into coke, while in addition any of the volatile gases not required for the coking process may be condensed and utilized for by-products. Dr. von Bauer has found that about 16 per cent. of gases are necessary for the combustion, but since, for instance, the Durham coals contain as much as 30 per cent. of volatiles they leave a handsome margin for obtaining by-products, and these ovens are all so constructed that the by-product condenser plant may be fitted to them at any time. At Messrs. Baird & Co.'s works, one of these plants is in full swing, giving very satisfactory results, but the ovens can be worked either with or without the by-product plant to suit variations in the coal.

MATTE SMELTING FOR SILVER.—III.

Written for the Engineering and Mining Journal by Chas. F. Torrance.

ROASTING FOR SULPHURATION.

At the outset I believed the roasting of lean ores to be a fatal mistake; I now feel assured that a process of preparatory roasting is, in many cases, necessary for the most successful treatment, but I would roast for a purpose just the opposite of that of the general practice, for sulphurizing and not for desulphurizing; except where an undesirable proportion of sulphur is present. Then, of course, the desulphuration, to the required degree, should be effected before or during the process of sulphuration of the oxidized or the metallic valuable portions of the charge.

When the mono-sulphide of iron, in excess, is fused in presence of finely divided metallic copper, lead or silver and free silica, with oxygen, or substances which, like the oxides of iron and manganese when in presence of silica, will yield oxygen in sufficient but limited quantity, then the iron of the mono-sulphide, with the silica, will appropriate this oxygen and give up an equivalent quantity of sulphur, in substitution for the same, to the other metals, as long as any of these are present; forming, thus, the sulphides of copper, lead and silver, as is desirable, before, or during the fluxing of the accompanying gangue.

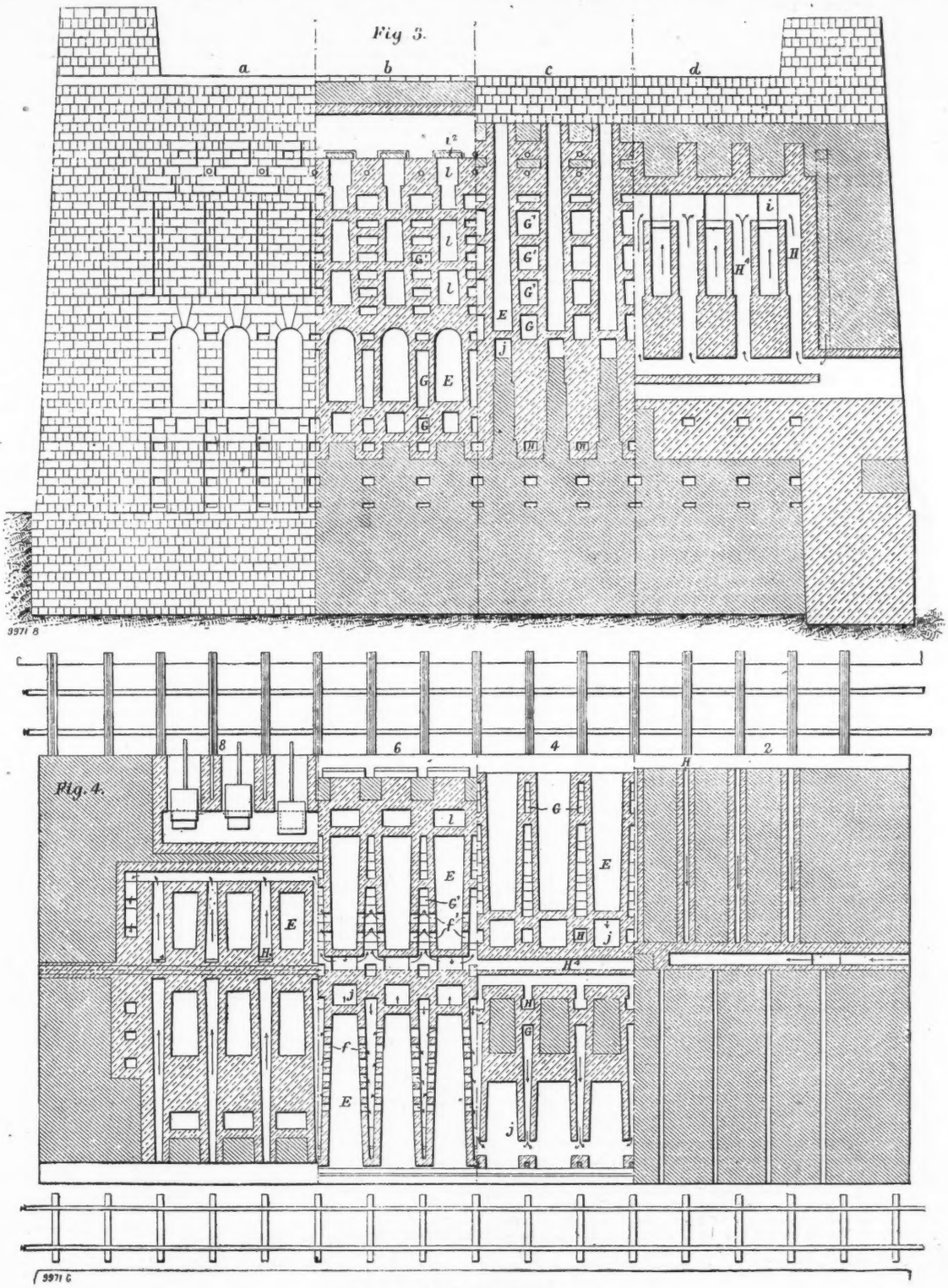


FIG. 4.—THE BAUER COKE OVENS.

$$4\,Ag + 2\,FeS + 2\,Fe_2O_3 + 3\,SiO_2 = 2\,Ag_2S + 3\,Fe_2SiO_4.$$

The oxides of these metals, if present, and all their oxidized compounds will also be converted into sulphides by the direct substitution of sulphur, from the iron sulphide, for the oxygen which is with the other metals, with simultaneous formation of iron silicate, or slag.

$$2\,PbO + 2\,FeS + SiO_2 = 2\,PbS + Fe_2SiO_4.$$

Now, as stated in my last paper, it is obvious that these reactions can not be depended upon in the reducing atmosphere of the blast-furnace;

and, further, that the fine state of division and the chemical contact of the particles during the fluxing, as is necessary for these reactions, are conditions incompatible with blast-furnace practice. These reactions can, however, be realized in the reverberatory furnace, quite as well as in the assay crucible. Until recently, I felt that they were applicable to reverberatory smelting alone; but a short time since the thought came to me that it would be entirely practicable to prepare the finely crushed ore for blast-furnace smelting by first roasting it, for this purpose of sulphuration, in a "Bruckner's Cylinder" or other rotary contrivance, with a final temperature sufficiently high to produce "fritting" and agglomeration of the charge, and then passing this hot plastic material through water-cooled bricking rolls, and so pressing it into suitable blocks for blast-furnace smelting.

The difficulties which are to be anticipated are many and great, but I believe that they are not fatal. Such a practical working process would solve the problem of the treatment of fine ore and concentrates.

The agglomeration of roasted copper ores, for blast furnace smelting, is spoken of by Vivian, who leaves us to infer that it is impracticable, on account of excessive temperature and fuel requirements. If the fluxes, which may be necessary for the smelting mixture, be added to the roasted ore, with a proper allowance of coal dust and with a little crushed slag to start the fritting or fusion, the whole being thoroughly mixed, then the ordinary high roasting temperature will be found sufficient, and the extra fuel which is required will be partly offset by the reduction in the amount needed for smelting in the blast furnace; while the rapidity of the fusion will be correspondingly increased.

In this matte smelting for silver, as adapted to ordinary and oxidized ores, sulphuration is to be effected, and, except in rare cases, the available sulphurizing material will be raw pyrites or pyritic ores. As already stated, it is quite practicable to sulphurize completely with the mono-sulphide alone; but it is also desirable, in most cases, to be able to utilize, for this purpose of sulphuration, the sulphur which is liberated by the heat from the raw pyrites or bisulphide of iron. For, since this liberated sulphur will be just equal in amount to that which is retained by the iron after fusion, it is evident that, if we could completely utilize it, there would be a clear gain of 100 per cent. in those cases in which we may wish to make our matte product as large as possible. Unfortunately, this sulphur is partly distilled at so low a temperature as to render its complete utilization somewhat difficult. The sulphur is given off gradually from pyrites as the temperature increases, and it is evident that several intermediate compounds of iron and sulphur are formed before the final reduction of the whole to the mono-sulphide. The known compounds, Fe_2S_3, Fe_3S_4 and Fe_7S_8, are probably produced, and these carry $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{7}$, respectively, of the surplus sulphur from that portion of pyrites from which either may have been formed. Probably all these retain their several portions of sulphur up to temperatures where they can certainly be utilized.

To utilize, practically, the largest possible proportion of the free sulphur, its vapor, as soon as set free, must come in contact with heated metallic particles. To accomplish this the finely crushed oxidized ores, with a considerable proportion of iron oxide—which is to be added if not contained—are to be charged first, in the rotary furnace, with coal dust, enough to partly reduce all the iron oxides which may be present and which are to be added after, as will be described elsewhere. After heating this mixture until a sufficient portion of metal is reduced, and until the whole charge is brought to a high roasting temperature, the pyritous portions of ore should then be added in several consecutive doses, so that the sulphur may be liberated under conditions favorable for its absorption. A thorough intermixing of these added portions with the rest of the charge should be effected meanwhile by rotation of the "cylinder." The sulphur will then combine with the reduced iron and other metals, and so be saved.

The reduction with coal should be toward, but not reaching, the hypothetical "protoxide," which is supposed (?) to combine with silica to form the ortho-silicate, Fe_2SiO_4, or ferrous slag. The other so-called "silicates" of iron are undesirable in a slag, for reasons which will be spoken of elsewhere (I do not mean to be understood as asserting the non-existence of a FeO compound; but, as I believe the evidence to be insufficient to establish, as a fact, the action or existence of such a compound in the formation of iron silicates at a fluxing temperature, I prefer to avoid the usual assumption). In the formation of such slag, the iron must first be reduced to the magnetic oxide, and then a further reduction must be effected in order to permit the combination with the silica. If this further reduction be made before the formation of the silicate, then metallic iron will be produced; if it be made at the time of the formation of the corresponding silicate particle, then this silicate particle is the product, and there is no proof of the existence, here, of the "go-between" protoxide. In the process which we are attempting to consider, a part of this reduction is to be effected with carbon *before* the fluxing or formation of silicates, and we will, consequently, have metallic iron in mixture with the magnetic oxide and silica. When such a mixture, of proper proportions, is brought to a fluxing temperature, the three substances react, chemically, upon one another, and enter into combination, forming the silicate.

Now, in this preparatory roasting we must not bring our fluxing iron to that degree of reduction which is theoretically requisite for the direct formation of this slag-silicate; because in the blast furnace fusion the reducing action of the furnace gases will produce a further reduction of metal which would desulphurize the silver, etc. On the other hand, if the reduction by means of the coal dust be insufficient, then there will be a loss of sulphur by oxidation from the iron oxide. Both the iron and the sulphur of a portion of the iron sulphide will be oxidized, after the disappearance of the metallic iron, by the remaining magnetic oxide during the fluxing. 100 parts of magnetic oxide will so oxidize 12·6 parts of FeS; 100 parts of sesqui-oxide will so oxidize 18·3 parts of FeS. Practically, then, we must try to find the exact balancing point between these two opposite tendencies; and we might begin with about one-half of the theoretical amount of coal, as required for the complete reactions, and then increase the quantity gradually uptil the best results are reached. The appearance of metallic iron in the matte will indicate that the limit is passed—or that the smelter is badly managed.

The amount of pure carbon* which would be required, theoretically, for the complete reduction of iron oxides to the degree requisite for the direct formation of this slag-silicate is, for sesqui-oxide, equal to 3¾ per cent., and, for magnetic oxide, to 2·59 per cent. of the weight of the respective oxides.

In addition to the amount of coal which is needed for the above purposes, and which, in practice, will be a variable factor, and one which is dependent, as already indicated, upon the quantity and the character of the fluxing oxides, and upon the uncertain gains and losses in the conduct of the process—in addition to this amount, we will require a further quantity of coal sufficient to reduce metal enough to combine with the balance which is left from the liberated sulphur from the raw ore; deducting, for such balance, from the whole quantity of sulphur so liberated the inevitable waste and the amount required for sulphurizing the originally metallic particles, as contained before treatment in the ore.

The amount of pure carbon* which is theoretically requisite for the reduction of metals from the lower oxides, in quantity sufficient to appropriate all of the sulphur liberated from raw pyrites by heat and fusion, is equal to $\frac{1}{20}$, or 5 per cent., of the net weight of the true pyrite which may be contained in the ore which is used. For black oxide of copper, copper silicates and corbonates, and lead sulphate, twice the above amount; and for sulphate of copper and sulphate of silver, four times this amount of carbon will be required: these sulphates, under the conditions of practice, being reduced to metal and sulphur dioxide. Allowance, according to the above, should be made for the proportions of sulphur which are appropriated, severally, by the different portions of metal from such several quantities of these compounds as may be estimated to be present. Lime and other basic matter will appropriate sulphur, but will give most of it up again in order to combine with silica, when enough of the latter is present. The slag which is to be made should be slightly acid to prevent loss of both sulphur and metal.

Sulphur which is in combination with arsenic or antimony may be estimated, in part, as free sulphur; for these elements will be set free, and, in a great measure, may be volatilized without resulphuration.

$$2\,AsS + 2\,Fe_2O_3 + 3\,C = 2\,FeS + 2\,FeAS + 3\,CO_2.$$

$$2\,FeAs + 5\,Fe_2O_4 + \tfrac{17}{2}\,SiO_2 = As_2O_3 + \tfrac{17}{2}\,Fe_2SiO_4, \text{ etc.}$$

It may, however, be found that the prevention of the production of a considerable proportion of speiss, during the smelting, is a matter of difficulty where much arsenic is present in the ores.

"Magnetic pyrites," or pyrhatite, also contains some surplus sulphur, if the formula Fe_7S_8, given by Remsen, be correct. It may be taken as equal, in this respect, to 19 per cent., or nearly $\frac{1}{5}$ of its own weight of true pyrite. "Copper pyrites," $CuFeS_2$, parts with $\frac{1}{4}$ of its sulphur, on fusion, and is equal to $\frac{1}{5}$ of its own weight of true pyrite.

The sulphurizing roast should be conducted with a flame as nearly neutral as possible; there should be no excess of air in the process. A portion of the iron oxide, or ore containing it, should be reserved from the initial charge in the roaster and added near the close of the roasting process. All the ingredients which may be necessary for fluxing the whole charge should be present before the last heating. A small portion of crushed slag should be added to start the fritting or incipient fusion.

The presence of a quantity of mono-sulphide of iron, sufficient to thoroughly saturate the whole charge, is necessary for the complete and perfect sulphuration of the valuable metals. The substitution of any other metal, which has a less degree of sulphur affinity than that of iron for the latter, in any particle of this sulphide, can only be effected by direct chemical contact of the particles of metal and sulphide at the time of the oxidation of the iron; and any copper, lead or silver sulphides, which may have been previously formed and which may not have come in contact with the iron compound, to be dissolved by it, will be reduced to metal on contact with the magnetic oxide of iron when in presence of silica at a fluxing temperature, and so will require resulphuration. The amount of the iron sulphide which will be necessary for such saturation of the charge may be equal to 10 per cent. of its weight, or possibly more. When the matte product from the smelter does not otherwise reach this amount, a part of such matte may, continually, be crushed and returned to the roasting charge after the addition of the pyritic portions. If necessary for making up the deficiency, one-half of the whole output may be thus returned.

This complete saturation of the charge with sulphides and the final presence of a quantity of magnetic oxide will be necessary, even when complete sulphuration of the valuable metals has previously been accomplished; for when any particles of the valuable sulphides are exposed to the air, or other oxidizing influence, before their collection by the iron sulphide, such particles will then be reduced to metal, or possibly oxidized, and the metallic particles, so formed, will require re-sulphurizing.

And further, as already explained, the presence of an excess of magnetic oxide is necessary to offset the reducing action of the blast-furnace gases. The presence of magnetic oxide in the slag will be a proof of the complete sulphuration of silver, etc., and the presence of metallic iron in the matte a proof of loss.

Where sulphur is to be got rid of, the supersulphurous ores should be charged first and roasted in the usual manner for oxidation, when they may be treated like, or with, the oxidized ores. Enough of sulphur should, of course, remain to effect the reduction of the iron oxides for slag (without the use of coal), and to keep enough of iron sulphurized for the production of the proper quantity of matte.

Finally, the temperature of the charge should be increased, as before stated, to produce agglomeration, and the whole may then be withdrawn and delivered to the bricking rolls. From these the stuff may be "elevated" into an elevated, closed, brick bin, where it should be mixed with a portion of pyritous ore, which should be reserved for this purpose, and which will be needed for obvious causes.

From the bottom of this "soaking bin" the roast-stuff may be withdrawn for smelting; and, by this arrangement, much heat may be saved, as the stuff will remain hot. The ore, when prepared in this way, should smelt very rapidly, and with but a small fuel requirement. A low furnace will give the best results. In any case, the lumps or bricks of pre-

* These percentages, as given, are based upon the supposition that the carbon, or coal, will be oxidized completely to carbon dioxide, which is not true; but, with the presence of silica, experiments have shown that this is much nearer the truth than had been anticipated. The error, whatever it may be, is on the safe side.

Fresh hot charcoal is equal to pure carbon, nearly. Old charcoal contains much moisture, etc., and, with coke and anthracite, may take 1¼ parts to equal, in reducing power, one part of carbon. Soft coal and sawdust, as reducing agents, may be taken at about 1⅓ and 2½ to 3 parts, respectively, to replace one of carbon.

pared ore should be as large as is consistent with complete fusion before reaching the yere region. The "stuff," when charged hot, may give trouble by softening and "gobbing" before fusion. This difficulty may be obviated, I believe, by mixing the fuel with the ore charge. I think that there would be but little danger from reduction of iron; as the incipient fusion, in the roasting, will have coated the unfused particles with slag, which will serve as a protection against reducing gases, and also against oxidizing influences as well.

The adaptation of a roasting furnace and plant to the practical requirements of this process is a matter yet to be worked out. "Bruckner's Cylinder" would need better firing arrangements and some means of discharging the plastic contents, and of delivering the same to the bricking rolls; also means of affording ready access to the interior of the furnace, for removal of "gobs," which will stick to the sides, etc. The "Siemens Rotary"†, as designed for the direct iron-making process, is a furnace which may be found applicable, with some modifications, to this process. "Bruckner's Cylinder" was, as hinted in the beginning of this paper, the first thought that came to my mind.

The bricking rolls, for the hot stuff, may be simply fluted, with semi-cylindrical depressions, and geared together so as to produce compressed cylinders of the stuff. This arrangement would give the surest feed and a free delivery. The "stuff" need not be very far advanced, in the fritting process, in order to cohere by compression.

The writer would apologize for the long delay in the preparation of these papers, and also for the many shortcomings in the manner and the substance of them, as his continued illness has prevented any better results.

One more paper will be offered.

† For a description of this furnace and its workings, see Howe's "Metallurgy of steel."

THE KHOJAK TUNNEL.

In our issue of July 5th we referred to the completion of the Khojak tunnel, which, more correctly, should have been described as the junction of the headings in the tunnel. We borrow from our contemporary, *Indian Engineering*, a drawing showing the work in section and the following description:

There is still more than half the enlargement of the tunnel to be done, and throughout the whole of this a masonry arch lining will require to be turned, so that fully a year must elapse before there is any prospect of through running being possible.

Meanwhile, the traffic is being carried on by means of temporary lines laid over the hill, and these exhibit several features of interest owing to their severity of grade and diversity of system.

When the three rival projects for the passage of the Kwaja Amran Range were under consideration, it was at first regarded as an objection to the route finally selected that the tunnel, which formed its chief feature, would take from two to three years to construct, and the Government of India considered that it was of paramount importance to establish communication across the range at a considerably earlier date, as in the event of complications again arising in Central Asia a forward movement of troops might be necessary.

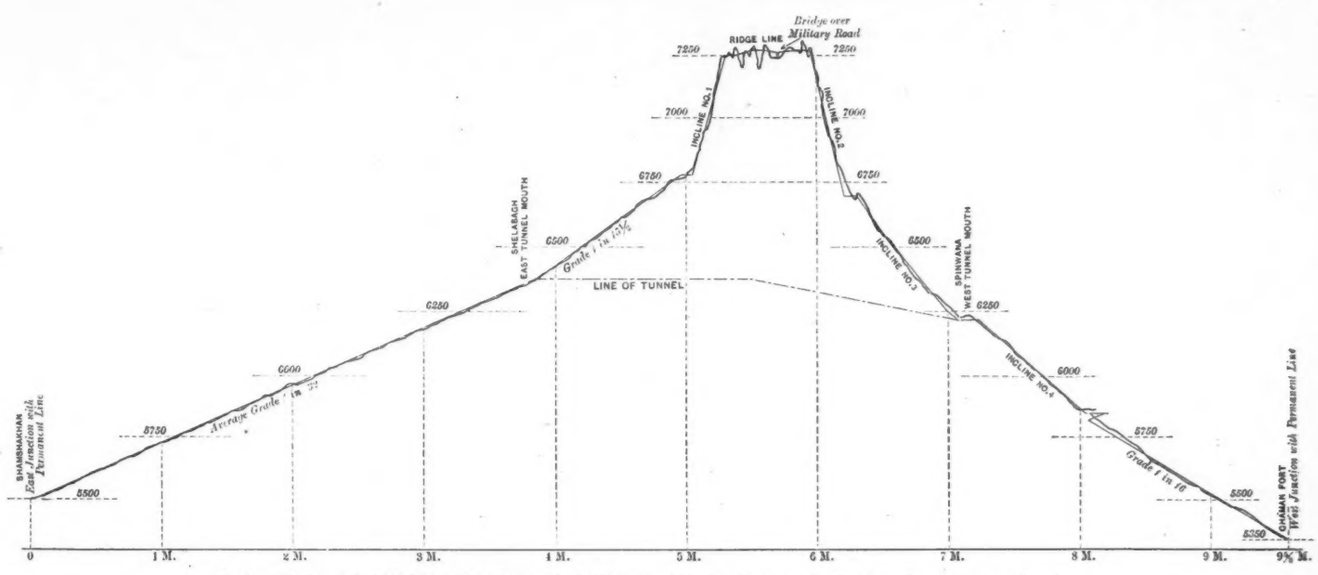
Accordingly a careful survey was made with the object of ascertaining the feasibility of making a temporary railway to be rapidly and cheaply constructed, pending the completion of the tunnel, and the line shown in the plate was the one finally decided on. The points which had to be borne in mind were (1) that, as the lines would be in use for two or three years only, it was imperative that they should be constructed as cheaply and as quickly as possible; (2) that the lines should be on the broad gauge throughout; (3) that the inclines should be sufficiently powerful to take over ordinary B. G. engines and rolling-stock and wagons of stores, etc., intact without breaking bulk; (4) that all the plant and appliances should be such as could be made in India, thus avoiding the inevitable delay of getting them out from England; (5) that the carrying capacity should be not less than 400 tons net per diem.

It will be seen from the section that the temporary line, after leaving the permanent line at Shamshakhan, rises at first with an average grade of 1 in 22; this section is worked by ordinary "heavy L" class engines. After passing the East Tunnel mouth the grade steepens to 1 in 15½; this portion is worked by specially-built 8-coupled tank engines. These engines have 18 × 26 inch cylinders, and are fitted with hand, steam and Chatelier brakes on all eight wheels; they take a load of 54 tons up a grade of 1 in 15, and round 500-feet curves—a very creditable performance. In order to increase their flexibility on the curves, the outside coupling rods are joined together with ball and socket joints, and the leading and trailing axle boxes have ⅜ inch play in the horns in both directions, or 1½ inches altogether.

The ridge line on the summit has a ruling grade of 1 in 40, and is worked by two small locomotives, converted from meter to broad gauge; and the last section of 1 in 16 down to Chaman Fort is worked by tank engines similar to those in use on the east side.

Particulars of the four rope inclines are shown in the table on the drawing; and it only remains to add that Nos. 1 and 2 are worked by stationary engines fixed on the top, while Nos. 3 and 4 are self-acting.

In the case of Nos. 1 and 2, in consequence of the severe grade, it was necessary to run the ordinary vehicles on to specially designed incline trucks, thus keeping the loaded wagon itself horizontal during its transit.



Scales: Horizontal, 4,000 feet = 5/8 inch; vertical, 400 feet = 5/8 inch. Figures give heights above mean sea level.

KHOJAK TEMPORARY RAILROAD LINE DURING CONSTRUCTION OF TUNNEL.

The temporary lines were completed and in working order in about a year, and cost in round numbers $170,000; they have carried up to date some 50,000 tons of stores for the tunnel and Chaman extension, the maximum day's work having been rather over 500 tons net.

DETAILS OF INCLINES.

	Grade	Length in feet.	Vertical Height, ft.	Max. Load.	Gauge.	Wire Ropes. Breaking Strain.	Working Strain.	Circum	No. of wires.	Weight per fathom.
No. 1.	1 in 2¾	1,320	452	30 tons	5 ft. 6 in.	78 tons.	12 tons.	4½ in.	114	19 lbs.
No. 2.	1 in 2½	1,420	568	30 tons	5 ft. 6 in.	78 tons.	13 tons.	4½ in.	114	19 lbs.
No. 3.	1 in 7 1 in 8 1 in 9 1 in 10	3,950	484	40 tons	5 ft. 6 in. double.	30 tons.	2½ tons.	4⅝ in.	72	14½ lbs.
No. 4.	1 in 8 1 in 12 1 in 13	4,700	376	50 tons	5 ft. 6 in. double.	30 tons.	4 tons.	4⅝ in.	72	14½ lbs.

A Fireproof Whitewash.—It is found, says the *English Mechanic*, that a most effective composition for fireproofing exterior surfaces may be formed by slaking a sufficient quanity of freshly-burned quicklime of the best grade. and, when the slaking is complete, there is added such an amount of skim milk, or water in its absence, as will make the liquid of the consistency of cream. To every ten pounds of this liquid is added separately and in powder, stirring constantly, the following ingredients in the order named: Two pounds of alum, 24 ounces of sub-carbonate of potassium or commercial potash, and one pound of common salt. If white paint is desired, no further addition is made to the liquid, though the whiteness is found to be improved by a few ounces of plaster of paris. Lamp black has the effect of giving it a number of shades, from slate color to black. Whatever tint is used, it is incorporated at this stage. and the whole, after being strained through a sieve, is run through a paint mill. When ready to apply the paint is heated nearly to the boiling point of water, and is put on in its hot condition. It is found that the addition of a quantity of fine white sand to this composition renders it a valuable covering for roofs and crumbling brick walls, which it serves to protect.

TESTING THE RELATIVE VALUE OF DIFFERENT COALS.

Written for the Engineering and Mining Journal by William Kent, M. E.

The writer recently had occasion to make a test of three different lots of coal for the purpose of determining their relative fuel value, to be used as a basis of a very large contract. During the tests some facts were learned which may prove of importance in other similar tests, and which show that the apparent fuel value as determined by a single series of boiler tests under uniform conditions may not be the true relative value in actual use.

This general fact was shown by the writer in a paper read at the Cleveland meeting of the American Society of Mechanical Engineers in 1883, on the "Evaporative Power of Bituminous Coal," in which paper he criticised the coal tests made for the government under the direction of Quartermaster General M. C. Meigs, and showed that the relative value of many bituminous coals as shown by these tests, in comparison with anthracite, was far below their real relative value. The statement was then made that "the relative value of bituminous coal is a variable quantity, depending upon the conditions under which it is burned."

Thus one Pittsburg bituminous coal tested by General Meigs gave a value of 96·8, as compared with 100 for anthracite, when tested in one boiler, and the same coal a value of only 76·2 when tested in another boiler. Johnson's tests in 1844 gave Pittsburg coal a value of 80, and Babcock & Wilcox Company's tests in 1883 gave it a value of 99·5, as compared with 100 for anthracite.

It is quite common to suppose that if two coals are tested by burning them under the same steam boiler, under ordinary average conditions, the area of grate, extent of heating surface, height of chimney, etc., remaining the same, and one coal evaporates say eight pounds of water, while the other evaporates only seven pounds, that the first coal has a higher fuel value than the second in the ratio of eight to seven. It may or may not be true, but if it should afterwards be found that by changing the conditions for each coal, as by altering the ratio of heating to grate surface, by checking or increasing the draught, or otherwise, so that a set of conditions, different for the two coals, might be found which would give a maximum performance for each coal, and the evaporation of one coal increased from eight to eight and one-half pounds, while that of the second was increased from seven to nine pounds, then the verdict that the first coal was the better would be reversed. The new statement would then be made that the second was the better in the ratio of nine to eight and one-half.

In the tests under consideration it was found that not only is the fuel value of a coal dependent on the boiler and its proportions, on the draught, and on the fireman, but that in a test with the same boiler, under the same conditions, and with the same fireman, the figures obtained in a boiler test, and even in two tests of each coal, would lead to erroneous conclusions concerning the relative value of the two coals, if these figures were not corrected by the *efficiency of the boiler* as shown in the several tests.

The following are the principal figures from the record of the tests of the three lots of coal referred to. The tests lasted from 9¼ to 9 4-5 hours in each case.

Number of test	1	2	3	4	5
	First series.			Second series.	
Designation of coal	A.	B.	C.	A.	C.
Heating surface, square feet	2,024	2,024	2,024	2,024	2,024
Grate surface, " "	50.8	50.8	50.8	43.2	43.2
Ratio heating to grate surface	39.8	39.8	39.8	46.9	46.9
Coal burned per hour, pounds	941	792	831	746	680
" per square foot of grate, pounds	18.5	15.6	16.4	17.3	15.7
Equivalent water evaporated from and at 212 degrees per hour	8,760.5	6,865.3	7,733.3	7,024.7	6,455
Do. per square foot heating surface per hour	4.33	3.59	3.82	3.47	3.19
Horse power	253.9	199	224.1	203.6	187.1
Water evaporated from and at 212 degrees per pound of coal, pounds	9.311	8.665	9.302	9.419	9.495
Ashes and refuse, per cent.	8.42	14	9.79	7.78	9.28
Combustible, per cent	91.58	86	90.21	92.22	90.72
Water evaporated from and at 212 degrees per pound combustible, pounds	10.167	10.076	10.311	10.214	10.466
Relative efficiency of boiler, test No. 5 = 100.	97.14	96.27	98.52	97.59	100
" " " " " 3 = 100.	98.60	97.72	100	.....	.....
Apparent relative value of coal No. 1 = 100.	100	93.06	99.90	.....	.....
" " " " " 5 = 100.	.....	.....	.....	100.81	100
Relative value of coal corrected for boiler efficiency, A = 100	100	93.90	98.50	98.36	100
Relative value of coal from percentage of combustible burned, A = 100	100	93.91	98.50	98.37	100

The boilers were two ordinary horizontal tubular boilers, 5 feet diameter and 16 feet long, each with 52 4-inch tubes. Each boiler had a separate iron chimney 28 inches diameter and 50 feet high above the grate. At 10 square feet of heating surface per horse power, the two boilers should develop 202·4 horse power.

The three coals were almost identical in appearance, all being very friable and bright, semi-bituminous. A proximate analysis made subsequent to the boiler test from samples selected during the tests gave the following, analysis made on dry coal:

Coal.	A.	B.	C.
Fixed carbon	77·17	74·23	74·29
Volatile matter	17·49	16·39	17·97
Total combustible	94·66	90·62	92·26
Ash	5·34	9·38	7·74

The proportions of the boiler, grate and chimney being judged as about right for developing the rated horse power with good economy, it was determined to make a trial of the three coals under the maximum draft which the chimney would give, and to preserve the conditions of the three tests as uniform as possible. The firing was carefully watched, to avoid the possibility of air holes being formed in the rear of the grate or in the corners; an even bed of coals 10 or 12 inches thick was steadily carried, and the top of the bed was raked only very slightly and at long intervals to check the slight tendency which the coal had to coking on the surface.

Coal A was first tested, and proved to be a remarkably good coal, burning very freely, and making almost no clinker, the fine white ashes, with a portion of the black friable coal, falling steadily through the grates, and the ash pit remaining bright for several hours after starting. The grates required a slight cleaning by a slice bar only once during the test.

The results show an evaporation of 9·311 pounds of water from and at 212 degrees per pound of coal, and 10·167 pounds per pound of combustible—not as much by from 10 to 15 per cent. as would be expected under the conditions; but the deficiency was explained by a very high temperature of the chimney gases, considerably over 680 degrees by the mercury thermometer. The pyrometer unfortunately got out of order during the test, and its figures were unreliable. The rate of evaporation per square foot of heating surface, 4·33 pounds, would scarcely account for the high temperature, and the cause was afterward found to be a faulty setting of the boiler, by which the lower rows of tubes were made partly ineffective, the upper rows carrying off the bulk of the gases at a high velocity and temperature. This condition being constant during all the tests, however, it did not interfere with the test of the relative value of the coals. The capacity, 253·9 horse power, was 25 per cent. above the rated capacity of the boilers, estimating it at 10 square feet per horse power.

The lesson to be drawn from this test, in addition to that learned about the imperfect setting, was that with the same setting better economy of coal could be gained by reducing the boiler capacity, either by checking the draft or by reducing the area of grate surface.

The test of coal B was then proceeded with, the conditions being unchanged. The coal acted very differently from coal A. Clinker was soon formed, and the grates required frequent slicing to allow enough air to be admitted to burn the coal at a rate sufficient to cause the boilers to develop their rated capacity.

The results gave a capacity of only 199 horse-power, or less than the rating. The evaporation per pound of coal was only 8·665 pounds, or 93·06 per cent. of that obtained with coal A, while the efficiency as shown by the evaporation per pound of combustible was also nearly 1 per cent. less. The high temperature of the chimney gases continued, the thermometer rising to 680 degrees before removal to prevent its breakage, but not so rapidly as in the previous test. The amount of ashes obtained in the boiler test, 14·0 per cent., as against 8·42 per cent. with coal A, left no doubt as to the inferiority of coal B. It gave 7 per cent. less economy while reducing the boiler capacity nearly 25 per cent.

Coal C was then tested under the same conditions. It burned so nearly like coal A that no difference could be observed for two or three hours when it was noticed that the ash pit was becoming dark, and that evaporation was not proceeding quite so rapidly as at first. The fire was becoming a little sluggish through accumulation of ashes. The bars required to be sliced two or three times during the test. The result showed nearly 224·1 horse power, 12 per cent. less than with coal A, but the evaporation of water per pound of coal was almost exactly the same, 9·302 lbs. as compared with 9·311 lbs., and the apparent relative value of the coal was 99·9 per cent. of that of coal A. The evaporation of water from and at 212 degrees per pound of combustible, however, was higher than that with coal A, in the ratio of 10·311 to 10·167 lbs., or as 100 to 98·60.

It was quite evident that the increased efficiency of the boiler when coal C was tested was due to the ashes of the coal choking the passage of air through the fire just to such an extent as to cause the coal to be burned more slowly, under the given conditions of grate area, setting of boiler, and chimney draft, and so slowly as to allow of more of the heat produced being absorbed by the water in the boiler and to allow less of it to pass up the chimney.

It was reasonable to infer, therefore, that if coal A had been burned more slowly, as it might have been, by a slight checking of the chimney draft by the damper, the boiler would have shown as high an efficiency as it did when coal C was tested, and, *per contra*, that if coal C had been burned as rapidly as coal A, the efficiency of the boiler with coal C would have been as low as it was with coal A. We may then state the problem, if coal C showed a fuel value of 99·9 as compared with coal A when the boiler efficiency was relatively 100, what would it show if the efficiency was reduced to 98·6? and solve it by the proportion:

C A C A
100 : 98·6 : : 99·9 : 98·50.

The figure 98·50 may, therefore, be taken as the corrected relative value of coal C as compared with coal A.

The two coals were tested again, as shown in the table, tests 4 and 5, the conditions being changed by reducing the grate surface from 50·8 square feet to 43·2 square feet, and thereby increasing the ratio of heating to grate surface from 39·8 to 46·9. In other respects the conditions were preserved as nearly as possible the same as in the former tests. As was expected, the actual evaporation from and at 212 degrees was increased for both coals, from 9·311 to 9·419 for coal A, and from 9·302 to 9·495 for coal C. The efficiency of the boiler was also increased from 10·167 coal A, to 10·214 for coal A, and from 10·311 to 10 466 for coal B. Comparing the evaporation per pound of coal in tests 4 and 5, the apparent relative value of coal C, is 100·81 instead of 99·9 as it appeared in the comparison of tests 1 and 3, thus reversing the conclusion which might have been drawn from the latter tests, which showed that coal C was one-tenth of one per cent. inferior to coal A, and making it appear that it was eight-tenths of one per cent. superior.

The relative efficiency of the boiler in tests 4 and 5 was 97·59 for coal A and 100 for coal C. Making the correction as before for relative efficiencies, we have the problem, if coal C gave a relative value of 100·81 when the boiler efficiency was 100, what would its value be if the efficiency was 97·59? and the proportion

C A C A
100 : 97·59 : : 100·81 : 98·36,

which figure agrees as closely as should be expected with the corrected relative value, 98·50, found in tests 1 and 3, and the average of these results, or 98·44, may be taken as the true relative fuel value of coal C, as compared with 100 for coal A.

The single test of coal B, which showed a relative fuel value as compared with A, of 93·06, gives a value, when similarly corrected for boiler efficiency, of 93·90.

The three coals, A, B and C, being of the same general quality, as de-

termined by the relative percentage of fixed carbon and volatile matter, shown by analysis, differing only in their percentage of ash, it would naturally be expected that their true relative fuel value in practice under the best available conditions for each coal would be in direct proportion to the percentage of total combustible matter actually burned in the boiler test, which is found by subtracting the ash and refuse withdrawn from the fire during the test from 100 per cent. Making the calculation of relative value on this basis we find a most remarkable coincidence, as follows:

	Coal B.	Coal C, test No. 3.	Coal C, test No. 5.
Corrected value, by boiler test, A = 100.....	93·90	98·50	98·36
Relative value, by per cent. combustible, A = 100..	93·91	98·50	98·37

It will not be safe to conclude from this coincidence, however, that it is a general rule that the fuel value of coal is in proportion to percentage of combustible, for the quality of the combustible matter varies in coals of different general chemical constitution, and in coals containing a very high percentage of volatile matter, as in most bituminous coals mined west of Pittsburg, it is not possible in any ordinary boiler furnace to thoroughly burn this volatile matter. It may, however, be considered as a general rule for coals of approximately the same chemical constitution.

It is moreover not safe to generalize that the true relative fuel value of two coals may be always obtained by multiplying their apparent value as found in a boiler test by the ratio of boiler efficiencies found in the tests of the two coals; but the rule may be stated as follows:

If in a comparative test of two coals of approximately similar chemical constitution, the apparent relative fuel value as shown by the boiler test differs less than the difference of boiler efficiency in the two tests, then the apparent relative values should be corrected for the difference in boiler efficiency.

This rule will apply in the case of coals A and C since their apparent fuel value varied only from — 0·1 to + 0·8 per cent., while the boiler efficiency varied from 1·4 to 2·41 per cent., but it does not apply to the comparison of coals A and B, in which the apparent fuel value differed 6·94 per cent., while the boiler efficiency varied only 0·87 per cent.

The reason why the application of the rule is thus limited, requires some explanation. In the comparison of coals A and C, it is evident that the apparent relative value of A is lower than it should be (or C higher), because A was burned too fast, which caused the lower efficiency of the boiler, and also that its relative value could in practice be made greater by checking the draft, without bringing the rate of evaporation below the normal capacity of the boiler. In the case of coal B however, the efficiency of the boiler is not lower because the coal was burned too fast—in fact it was burned too slowly, as the boiler did not develop its rated capacity. Slow burning should of itself give high efficiency, and that it did not give higher efficiency than coals A and C, but lower, is no doubt due to the fact that the greater amount of ash and clinker it made, required the fires to be cleaned oftener, letting cold air pass through the fire door during the operation, and an excess of air pass through the grates at the time of every cleaning. By no change of draft or of grate surface could the efficiency be raised, without still further decreasing the already low capacity, hence the correction for low efficiency should not be made to get the practical fuel value.

Making the correction for boiler efficiency in the case of coal B does, in fact, raise its apparent relative value from 93·06 to 93·90, which is almost identical with the figure obtained from comparison of the percentage of combustible, 93·91, and it shows that if the efficiency of the boiler could, by any means, have been raised to the same value as was given in the test No. 1 of coal A, then the relative value would have been 93·90; but as the efficiency could not have been so raised without diminishing the capacity of the boiler below its normal rate, the supposition is not of practical value, and the correction should not be made. The fact is that when the ash in a coal is so great in amount as to necessitate frequent cleaning of the fires, its effect in reducing the fuel value of the coal is greater than that due to its mere percentage. It reduces the capacity of the boiler as well as its efficiency, besides giving extra trouble in handling the fires and getting rid of the ash itself.

The writer is not aware that other experimenters on relative values of fuel have made use of the corrections for boiler efficiency described above, but he believes that the corrections, applied within the limits indicated, are of sufficient importance to receive attention in future tests of this kind, even when the tests are made for commercial and not for sientific purposes.

COFFER DAMS AND FLOATING CAISSONS.*

By Randell Hunt, C. E.

Coffer dams are used when it is necessary to pump out or excavate a foundation pit, and to keep the work on the inside dry. There is probably no other class of work in connection with foundations so generally mismanaged. This lack of knowledge tends to make the cost excessive, while the many failures render many a contractor reluctant to undertake that kind of work.

A well designed dam, built under certain conditions of depth of water and *variety of soil*, is perfectly adapted for all similar work; and it is possible to prescribe a standard set of designs for foundations of almost all characters.

Coffer dams being structures, to last, generally, only the short time while the permanent foundation inside of it is being constructed, it is of the utmost advantage to reduce their cost to the lowest possible amount.

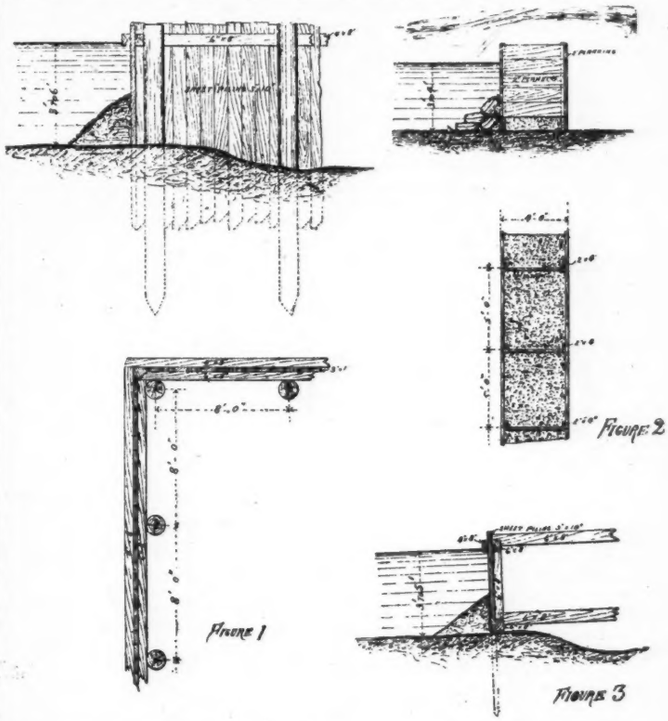
In still, shallow water, where the soil of the bed of the river or stream is more or less impervious to quick infiltration, a mere embankment of clay or earth made with sufficient strength to withstand the pressure is generally the cheapest, and a very efficient coffer dam. Dams made of a large proportion of sand and gravel mixed with but a small quantity of clay or stiff mud can be used up to considerable depth; but as their dimensions increase very rapidly in volume for but a limited increase in height, they usually become unwieldy.

A very good coffer dam in depths not exceeding four or five feet is to make a cheap crib with sides of planks two inches in thickness (see Fig. 2), and with a width equal to the depth of water. Earth placed in the pockets of this crib, which has been settled at the desired foundation site, will generally sufficiently puddle itself in the process of being put in place. There will be very little leakage in such a coffer dam, if the same is used when the sides of the crib touch the soil at its bottom edge pretty evenly all around. The water will seldom get through the filling above the important joint, between the filling material and the natural surface of the ground, even if the sides of the crib are not tight; but at the bottom of the filling the least little seam, due to lack of close contact, will be apt to lead to an ever increasing leak until the crib is often completely undermined. For this reason the earthen coffer dams are most successful when placed upon a soil not too porous. For, due to the pressure from the outside of the dam, a loose soil will admit of a seapage, which invariably takes place at the "joint" where the filled crib rests upon it, and the grains of sands flow into the dam until the undermining becomes serious. A compact material in these small coffer dams which will cement itself closely to the ground, and not permit of the leakage of coarser gravel, is therefore desirable.

If the soil is porous, the base of the dam, as an unprotected embankment or as a crib, should be as broad as possible, or a different kind of coffer dam should be used.

An earthen dam, without the protection of the crib, will need slopes about one and a half to two horizontal, to one vertical, on both its outer and inner sides, and thus require more room than usually can be spared for such work; besides, the expense of such an embankment would be much in excess of the crib made of simple planks.

Where the current is strong enough to scour the foot of an embankment, or to eat its way under the edge of a crib, a useful expedient is to deposit a row of bags, *e. g.* of gunny sack, filled with sand or concrete, at the foot of the slope or at the edge of the crib. In the latter case it is better to fasten canvas to the outsides of the crib and place the bags on top of it, as close to the edge as possible, as shown in the figure.



A coffer dam should be as dry as it is possible to make it, and if made of sheet piling the numerous leaky places likely to show themselves when the dam has been pumped out, prove the importance of care in all the details of construction.

Figure 3 shows a section of a properly designed sheet-pile coffer dam, applicable for considerable depths if constructed in an impermeable soil.

The sheet piles are driven against waling pieces, which form a frame-work about the foundation site, and serve as braces against the sides, to which the cross braces are attached. The sheet piles should be continuous all around the dam, all of tongue and grooved or other matched lumber, without any break in the continuity of the matched material except the unavoidable connections at the joining of the beginning and end.

The old method of driving sheet piling between upright posts placed at certain intervals is wrong, as at every post a bad joint is likely to occur. The sheet piling may not be driven perfectly vertical, and to make the last one of a panel between posts fit tight against the side of the post, as well as form a close joint with the preceding sheet pile, is very difficult. The sheet piling if properly shaped and driven will make a close fit with one another and not require the posts to aid in wedging them together. Large posts which may be required as lateral support to the sides of the coffer dam are better placed on the inside of the dam, where they do not interfere with the sheet piles. It is well to place a waling piece on the outside of the sheet piles at their tops, and drive them between this and the inside waling piece. The sheet piles get so thoroughly soaked together that there is but very little leaking.

The frame-work of waling pieces should be carefully put in position before driving the sheet piles, by framing it together of the size desired, and separating the upper and lower belts of walings by small upright posts placed between them and joined to them. This frame can be sunk

* Abstract of a paper in Transactions of the Technical Society of the Pacific Coast.

at the desired location and the sheet pile driving commenced against it. If there is much excavation on the inside of the dam another set of side pieces or walings can be put in and pushed down as low as desired. To make the dam complete, on the outside should, if convenient, be deposited a footing of impervious soil, which will stop up any small holes in the dam.

Another very good and inexpensive form of coffer dam is made by

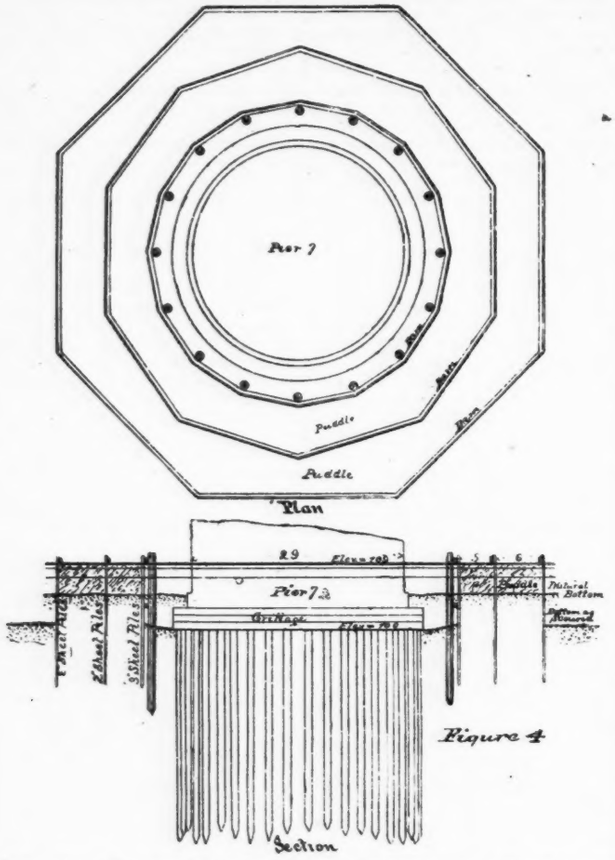


Figure 4

driving sheet piles against the outside of the timber crib above recommended for coffer damming in shallow water. Such crib and sheet-pile combination can be used in considerable depth of water, up to ten feet or more, if placed upon an impermeable soil. But coffer dams with cribs are generally made of much heavier material than the thin planks recommended above, as further on will be mentioned.

Fig. 1 shows one of the most serviceable sheet pile coffer dams for shallow water. The good stiff frame, whether made of the frame of walings, or cribs, or bottomless caissons, should always be well braced with cross-braces to prevent any distortion when the pumping and excavation takes place.

Success in foundation work is incompatible with haphazard constructions. Coffer dams upon sand and gravel are structures of magnitude and great cost, whenever the head of water to be shut out becomes greater than four or five feet, and must be founded on different principles.

As mostly sands and gravel are porous for almost unlimited depths, the simple crib or bottomless caisson with a single row of sheet-piling driven to moderate depths will, even with the best workmanship, not prevent the whole bottom of the foundation from allowing the water to leak through. Often the force of the leaking water sets the sand (particularly if rather fine grained) in motion, it becomes more or less quick, and the dam is a failure.

To construct a coffer dam in sand with any certainty of success requires that the damming shall be done by carefully driving the sheet-piling, which must be well matched together, below the level of the excavation on the inside of the dam to a very considerable depth, which must depend somewhat upon the character of the sand; if light and not very compact, a rough rule is to put the sheet-piling next to the foundation as deep below the bottom of the excavation as the head of water above it.

When the head of water on the outside exceeds a few feet, the coffer dam is best made by driving two rows of sheet piles, spaced as many feet apart as the head of water, up to ten feet depth, and about three-quarters of the head for dams of greater height.

The space between the rows of sheet piles should be excavated to a depth from two to five feet below the line of the excavation on the inside of the dam, and then filled with carefully puddled material of clay, loam or a mixture of either of these with coarse gravel.

The frame-work for the inside row of sheet piles is usually made, as shown in Fig. 1, of large piles, with waling pieces spiked to them. These large piles add lateral stiffness to the dam and avoid the need of too many cross-braces, which are a hindrance to the work inside.

The labor of driving sheet piles being always one of the most expensive items of coffer dam work, the double row of sheet piles, their increased length and the extra labor required to drive them, increase the cost to a large extent, but often only apparently, as the cost of pumping is thereby much reduced.

If, in such a dam as last described, there are bad places, a certain amount of hay or manure, on top of which is deposited clay and gravel, is an advantageous filling material, as it is drawn into the crevices by the leaking water and chokes them up. The gravel is preferable to clay or loam, as it follows down and presses against the hay, while unable to escape.

For coffer dams made of a single row of sheet piles, a little hay and manure placed against the outside of the piles and then filled on the top with gravel and sand is often of great use.

Fig. 4 shows the coffer dam which was used in constructing the foundations for the pier for the draw span of the Chippewa River bridge, on the Chicago, Burlington & Northern Railroad in Wisconsin. It is founded in a moderately fine sand of unknown depth, borings as deep as 50 feet showing no other formation. The piers are placed upon piles cut off about as deep as the river usually scours.

The original plans contemplated cutting off the piles three feet lower than shown in the drawing, but as three centrifugal pumps—one seven inches and two five inches in diameter—could only lower the water to a few inches below the tops of the piles as given, the foundation was raised these three feet, and brush mattresses and riprap put in to guard against future scour.

The coffer dam was made of three rows of sheet piles, spaced about six feet apart, the inner row being braced by walings against large piles. The inside sheet piles, made of three-inch oak planks, matched together with a V-shaped tongue and groove, the two outside rows of two inch pine matched boards, were not thick enough to stand the hard driving without detriment to the joints.

No dredging of the material between the different rows of sheet piles was done before the puddling was deposited. It ought to have been done to a depth at least as low as the excavation inside the dam.

The dam leaked badly through the joints between the sheet piling, specially near the bottom of the excavation on the inside of the dam. A large amount of water came also through the bottom of the foundation pit. Instead of a coffer dam an open caisson, sunk on the pile tops after a previous removal of the sand, would have been the proper construction. As Professor Baker puts it. "Probably a coffer dam was never built that did not require considerable pumping, and not infrequently the amount is so great as to make it clear that some other method of constructing the foundation should have been chosen."

Canvas is seldom necessary in sheet-pile coffer dams except when the filling on the outside of a dam is liable to be washed away by a too rapid current. Then canvas nailed securely on its upper edge to the sheet piling can be spread out over the filling, and its lower edge weighted down by heavy stones to the bed of the stream, thus securing the dam from any scouring effects. In the same way it is often used on the lower edge of bottomless caissons which rest on rock or sandy soil.

When a coffer dam is made of sheet-piling upon a rock foundation, the frame-work against which the sheet piles are to rest should be anchored in place by long steel rods, drilled into the rock at certain intervals. The wooden sheet piles are then put in place as in any other coffer dam, only well spiked to the waling pieces of the frame-work to prevent their floating up; and they should be so driven that their ends will slightly bruise themselves against the rock. The dam is then to be completed by a toe, on the outside, of clay filling, which may be protected by canvas.

Very successful coffer dams have been made of cribs in connection with sheet-piling on exactly the same principles as those of sheet piles against a frame-work. Their great stiffness makes them well adapted for use in deep water.

In improving the navigation of the Schuylkill River in 1880 a floating coffer dam (represented in Fig. 5) was used.

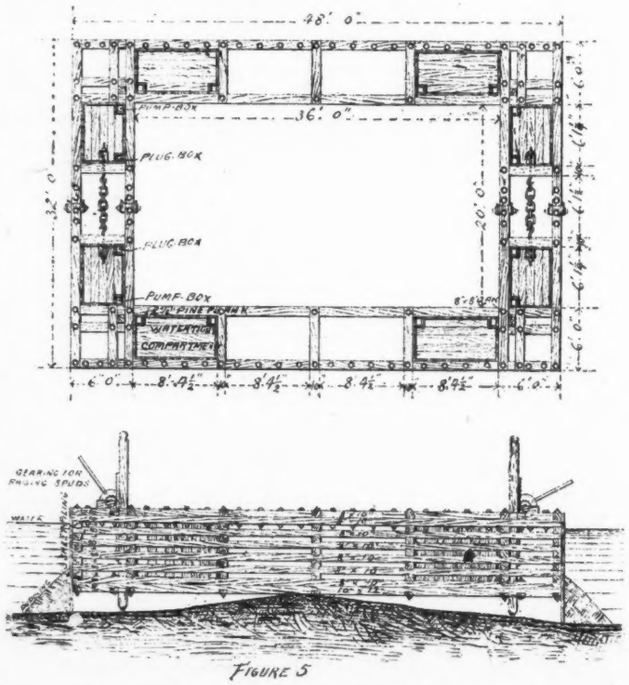


FIGURE 5

The outside dimensions were 32 by 45 feet, and the inside 20 by 36 feet. The dam was framed in two longitudinal halves for the purpose of passing the locks of the navigation, the two cribs, when coupled end to end, making a float 96 feet long by 16 feet wide.

This novel design, with its facility for moving it, made it well adapted

for use in constructing foundations for bridge piers, after which it could be readily removed without injury to the dam itself, by uncoupling and removing each section. Water-tight chambers or boxes in the crib enabled it to be floated from one point to another, and afforded great facility in settling it over obstructions.

When the crib was floating in the desired position, the long timbers marked *B*, let down into the river bed, held it in place. The water-tight compartments then allowed to fill with water, the crib would sink to the ground. If additional weight was required these compartments would be filled with stone. After the crib was well grounded sheet-piling was driven against it, on the outside, all around. Puddling of heavy, gravelly material was then placed around sheet piling, after which the dam was pumped out. The crib was framed eight feet high, and, usually, operated in seven and a half feet of water. The dam was removed by pumping out the water-tight compartments, clearing them of stone and pulling up the sheet-piling, which was three and four inch jointed white pine and was used over and over again with but a small addition of new material for each dam.

It is stated that the original cost of the dam, in 1879, was $1,128, and that it was used for several years; but at many locations the sheet-piling was so tight that the leaking generally required a 6-inch Andrews centrifugal pump to run only three minutes out of every ten. This dam required bracing inside while being pumped out; and during the prosecution of work a steam drill was used in removing the rock. The dam was well designed.

If, however, the outside of the crib had been made solid instead of with spaces between the timbers, this water-tightness would have reduced the duty of the sheet-piling to preventing leaking underneath the crib.

When some protection is desired to remain permanently about a foundation of a coffer dam, it is advantageously made of cribs of timber, filled with rock, leaving the whole dam in place, the space between the dam, and the foundation also, being filled with rock.

(TO BE CONTINUED.)

GEMS AND PRECIOUS STONES.

Kuhlow's Trade Review of Berlin says: "We take especial pleasure in announcing the publication of "Gems and Precious Stones of North America," by George F. Kunz. This book is pre-eminently the standard work of its kind, and is indeed the only one which treats of the subject in a detailed and thorough manner. It is a systematic and at the same time a popular description of the several species and varieties of precious stones and pearls; their occurrence, value, history and archæology. For the collector of precious stones and minerals it is especially valuable, the illustrations being all drawn from the finest known examples, and reference being made to the collections in which they may be seen. No work has ever appeared which furnishes to the archæologist and antiquarian so many references to the precious stones and pearls which have played an important part in early history.

"The magnificent work is profusely illustrated with the finest colored plates ever prepared for a book of this kind. The publishers have spared no expense to make this in every respect the finest example of American art. The work has been published by the Scientific Publishing Company, New York, in a style peculiarly appropriate to its subject. The volume is positively precious in the perfection of its paper, type and press-work, while a number of colored plates embellish it in a rare fashion."

President Scientific Publishing Co.

DEAR SIR: I must express my sincere thanks for the copy of "Gems and Precious Stones of North America," by G. F. Kunz, which you had the kindness to send me. I have read this beautiful volume with great interest.

The United States, with their considerable treasures of coal, minerals and metals, prove richer than supposed in gems and ornamental stones also. This lesson taught by the (American) collection of the Universal Exposition of 1889 is still more impressed on the reader of this mineralogical publicaion by the painstaking care of Mr. G. F. Kunz.

The author has collected, with judgment and thorough mastery of the subject, a great number of facts appreciable to readers of very different orders. The matter as well as the form leave nothing to be desired.

Yours, etc., A. DAUBRIE.

MUSEUM D'HISTOIRE NATURELLE, PARIS, July 2d, 1890.

SOCIETIES.

A SOCIETY OF SWEDISH ENGINEERS.

The incorporators of the American Society of Swedish Engineers, incorporated under the laws of the State, July 14th, are as follows:

Jonas, Emil Blomen, A. H. Fries, Magnus Dahlender, J. Brodin, William Rydler, Carl Richson, Frederick Lillihook, Gust. Pers. Wern, John Meyer, Karl Hedberg, Ernst Gundzrey, F. Olof Offern, A. Jonsson, John Rudenbery, Emil F. Johanson, Brooklyn; Ernst Otterstrom, J. F. S. Branth, A. Sandgren, Mr. Jurettenberg, New York: Swan Andersen, Stapelton; Erik Enequist, Flushing; Emil Emgarth, Axel H. Engstrom, Stephen Rozycki, Adolph L. Kuylenstjerna, Charles A. Psilander, Gust. E. Anderson, Ernst V. Victoreen, A. Teod Block, Gleiman Weiberth, Theodor Tohlin, C. A. Blomberg, Philadelphia.

The Congo Railway.—A recent cable dispatch from Brussels is to the effect that the latest mails from the Congo say the work on the railroad is making rapid progress. The force now employed numbers 74 Europeans and about 1,000 negroes. There are 10 engineers, 8 superintendents of construction, 33 miners, besides machinists, carpenters, masons, accountants and storekeepers. The road has been graded north along the bank of the Congo to the Leopold ravine, across which a bridge 70 feet long is being built. It has been settled that the line will skirt the bank of the Congo to the Mpozo river, which it will cross on a bridge about 200 feet long. It will then ascend the valley of the Mpozo and gain the comparatively level plains south of the Congo,

Profits of Coal Mining in France.—Coal mining is probably more profitable in France than in any other country of Europe. From official statistics just published we learn that the annual dividend paid to the shareholders in the mines of the Nord and the Pas-de-Calais in the 10 years from 1878 to 1888 was 1·83 francs per ton of coal extracted. In other districts still higher profits have been made. Thus in the district of the Loire the four principal companies distributed in 1888 a dividend amounting to 3·40 francs per ton of output as an average. In the department of the Gard, the Grand Combe Colliery Company paid in the same year a dividend of 2·85 francs per ton. In the Centre the Blanzy Colliery Company paid a dividend of 2·33 francs, and the Carmaux Collieries, in the Tarn, one of 5·52 francs.

Tests of Iron After Forty Years' Service.—A square link 12 inches broad, 1 inch thick and about 12 feet long was taken from the Kieff bridge, then 40 years old, and tested in comparison with a similar link which had been preserved in the stockhouse since the bridge was built. The following is the record of a mean of four longitudinal test pieces, 1 x 1¼ x 8 inches, taken from each link:

	Old Link Taken from Bridge.	New Link from Storehouse.
Tensile strength per square inch, tons	21·8	22·2
Elastic limit " "	11·1	11·9
Elongation, per cent.	14·05	13·42
Contraction, per cent.	17·35	18·75

—*Stahl und Eisen.*

Gas-furnaces for Copper.—While, owing to the lower temperature used in smelting, refining, and heating copper, no such economy of fuel is to be expected from the use of regenerative gas-furnaces as they effect in iron metallurgy, yet it has been a natural source of surprise that they are not more used in copper metallurgy. Alexandre Lencauchez, 156 Boulevard Magenta, Paris, has, however, introduced a considerable number, and with success. He has built four copper-refining furnaces at St. Denis, which are thought to effect a saving of 20 per cent. of the fuel. The charge weighs 12 tons, and, as usual, lasts 24 hours, three tons of locally cheap coke being used. Though these furnaces have been running for more than five years, the original recuperators are still at work, while the roof is repaired every four months. Altogether he has erected about 60 heating and refining gas-furnaces for copper. His gas-furnace is estimated to cost about twice as much as a direct-firing furnace.

Durability of Steel Rails.—The Great Central Belgian Railway commenced collecting statistics upon the subject in 1869, in which year it laid down a certain quantity of steel rails and a certain quantity of iron rails; 75·85 per cent. of the latter have since been replaced, while the steel rails have been replaced only at the rate of 1·07 per cent. These figures represent average durability, and not the durability upon portions of the system over which a heavy traffic is daily carried. Upon the Lodelinsart and Marcinelle incline, for instance, the durability of steel rails has been found to be much less. About thirty heavily-laden trains pass over this incline every day, brakes being freely applied, so that the rails are ground up much more rapidly than upon level sections presenting no special feature. The steel rails down in 1869 upon the Lodelinsart and Marcinelle incline held up bravely for the first twelve years, in spite of this severe strain, only 0·89 per cent. having been withdrawn up to 1881. In 1882, however, they began to give out, and the proportion of replacements rose to 48·37 per cent., while in 1883 it was further carried to 50·77 per cent. Steel rails last much longer than iron rails, simply because they possess a greater homogeneity and are less liable, in consequence, to lamination and disintegration.

Use of Heated Air Under Steam Boilers.—A series of tests to determine the influence upon economy of steam boilers of the use of heated air was made by Mr. Poupardin at Mer Rouge. An apparatus consisting of a series of cast iron pipe was placed vertically in the flue. The upper ends were open to the air, and the lower ends opened into a chamber from which the heated air was conducted to the front of the boilers. Two series of tests were made with two groups of three boilers each, working one week with the heated air and the next with cold air. The following were the several efficiencies:

FIRST TRIALS, ROUCHAMP COAL.

With heated air	128 degrees Fahr.	7·77 pounds water per pound coal.	
With cold air	69·8 " "	7·33 " " " "	
Difference in favor of heated air		0·44 " " " "	

SECOND TRIALS, SAME COAL, THREE OTHER BOILERS.

With heated air	120·4 degrees Fahr.	8·70 pounds water per pound coal	
With cold air	75·2 " "	8·09 " " " "	
Difference in favor of heated air		0·61 " " " "	

These results show economies, in favor of heating the air, of 6 per cent. and 7½ per cent.—*Bulletin Société de Mulhouse.*

Electric Traction Data.—Tests have recently been made on the Frankfurt-Offenbach electric tramway, with the following results: A motor car with loaded passenger car attached, the whole weighing 7½ tons, was used in the test. The electromotive force varied between 240 and 300 volts. At starting the current was 80 to 100 ampères, which fell to 40 in 10 seconds, and the mean current on the level road at eight miles an hour fluctuated between 15 and 25 ampères. On a gradient of 2·8 per cent., 53 to 60 ampères were recorded. The highest amount of energy recorded at any one moment was at starting, 21,700 watts, or 29 H. P.

Dr. Louis Bell gives the following results of tests on the Lafayette, Ind., electric street railroad. The runs were made on the level, with a loaded car weighing 8,200 pounds.

Miles per hour.	Volts.	Ampères.	Electrical horse power.
7·5	404	9·5	5·15
9·3	416	10·4	5·79
9·1	393	10·7	5·40
10·9	434	16·1	9·35
12·4	433	15·4	8·93

Another test, on a gradient of 6·58 per cent., one-tenth of a mile in length gave the following:

Miles per hour.	Volts.	Ampères.	Electrical horse power.
2·73	347	27·2	12·65
4·20	403	27·4	13·47
9·30	409	31·3	17·14
6·20	365	32·4	15·85

PERSONAL.

Mr. E. R. Stettinious has resigned the secretaryship of the St. Louis Exchange.

Mr. John D. Frossard, M. E. and Geologist, 30 St. Francois Xavier street, Montreal, has gone to Newfoundland on professional business and will remain absent about five weeks.

Professor James R. Soley resigned his position in the Navy Department on the 16th inst., and was appointed Assistant Secretary of the Navy. Prof. Soley is the author of several well-known books on naval subjects.

Dr. William B. Phillips, who has latterly been engaged in engineering and metallurgical work in the Birmingham district, and is now opening some brown ore and magnetite mines for the North Carolina Bessemer Company, in McDowell County, N. C., has been appointed to the chair of chemistry and metallurgy in the University of Alabama, at Tuscaloosa. Those in charge of this institution are taking steps to build there a good school of practical science, in which direction the appointment of Dr. Phillips is a first step.

OBITUARY.

James W. Queen, the well-known mathematical instrument maker, died at Cresson Springs, Pa., on the 12th inst.

William B. Fitch, a pioneer of the Hudson river bluestone business, died at his home in Kingston, N. Y., on the 15th inst., aged 67 years.

Charles Schmitt, one of the oldest and best known members of the petroleum trade, died in Brooklyn on the 16th inst., aged sixty-seven years.

William Sweetland Dallas, F. L. S., F. G. S., the able and accomplished Assistant Secretary, Librarian and Curator of the Geological Society of London, died on the 29th of May last. For the long period of twenty-two years he had done invaluable service to the Society and by his courtesy, kindliness, and helpfulness had endeared himself as a personal friend to the Fellows.

Joseph Paxson, who was born in Kensington, Pa., October 15, 1813, died on the 15th inst., at Philadelphia. He was connected in business relationship with John Rice, the celebrated builder, who was the contractor for the erection of the Continental Hotel, Horticultural Hall, of the Centennial; Farmers and Mechanics' Bank, the Fidelity Trust and Safe Deposit Company's building and other well-known structures of Philadelphia.

Gen. Silas Seymour, who, as civil engineer, had to do with the construction of many works of commercial and national importance, died in this city on the 16th inst., at the age of 73. While professionally connected with the Erie Railway Company he built the Portage bridge over the Genesee river. He was elected State Engineer in 1855, and while in office had charge of the work of enlarging the Erie canal. During the Civil War he aided in the organization of the military railroad service. After completing the Washington aqueduct and building a railroad bridge across the Potomac at Washington, he became in 1864 consulting engineer of the Union Pacific Railroad, and served as such until the completion of the road in 1869. After connection with other railways in Canada as well as this country, he was again elected State Engineer in 1881. This time he opposed any improvement of the Erie and other canals, believing that they could no longer compete with railways. He also took steps to prevent the spoliation of the Adirondack forests.

Gen. Daniel T. Van Buren died at his home in Plainfield, N. J., on the 17th inst., in the sixty-seventh year of his age. Gen. Van Buren was a son of the well-known jurist Judge Van Buren, of Kingston, N. Y. He entered the West Point Military Academy in 1843, and was graduated in 1847, ranking No. 6 in a class of thirty-eight men. He was made a Second Lieutenant in the Second Artillery on graduation, and served in the Mexican War. On February 14, 1849, he was commissioned First Lieutenant. He served as Assistant Professor of Natural and Experimental Philosophy at West Point, and afterwards was on the Coast Survey, resigning from the Army March 31st, 1855. General Van Buren entered the Union service immediately after the outbreak of the Civil War, and was Captain of Engineers, Twentieth New York Militia, and afterwards Chief of Staff of Maj.-Gen. John A. Dix. Later he was Assistant Adjutant-General on the staff of Maj.-General Hooker. On March 13th, 1865, he was breveted Brigadier-General of United States Volunteers for faithful and meritorious services during the rebellion, and was mustered out of the service March 20th, 1866. After that he was engaged as a surveyor and civil engineer.

INDUSTRIAL NOTES.

The West Hamburg (Pa.) Iron Works resumed operations on the 9th inst., after more than a week's idleness.

The scale of prices offered by the Amalgamated Association has been signed by the operators of the Pottsville Iron and Steel Works.

The Blake Manufacturing Company, of Boston, Mass., builders of steam pumps, has been sold to an English syndicate, at a price said to be $3,000,000.

The strike at Birmingham, Ala., on the Tennessee Coal and Iron Works has been settled. A contract has been signed for one year at old prices.

A dispatch from Vienna says that the Austrian iron masters have decided to prolong their agreement relative to the prices of iron three years, dating from January 1st.

An explosion of gas occurred in blast furnace No. 1 at the Cambria Iron Works, Johnstown, Pa., on the 17th inst., by which four men were badly injured, two of them fatally.

The Reading Company's Keystone Colliery, at Ashland, Pa., which has been idle for several months, resumed operations on the 14th inst., employing 300 men and boys.

The Belfont Iron Works Company and the Kelly Nail and Iron Company, both of Ironton, O., have decided to erect a steel plant. Work on it will probably be commenced in a short time.

Four thousand employés of the National Tube Works, at McKeesport, Pa., have been locked out. The company is willing to pay Amalgamated Association wages, but refuses to sign the scale.

Fraser & Chambers, of Chicago, have taken out the requisite permits for the erection of new two and four-story foundries on West Twelfth street, to cost $150,000, and a one-story boiler shop on Washtenaw avenue, to cost $80,000.

The Narragansett Electric Light Co., of Providence, R. I., has contracted with the Babcock & Wilcox Co. for 1,120 H. P. additional boilers, and also for the reconstruction of its present Moore boilers into the Babcock & Wilcox system.

Mr. R. P. McCormick, the contractor who has been driving the Mississippi River Tunnel, has driven 298 feet of clear tunnel during the month of June, with the Ingersoll-Sergeant drills and air compressors. This extraordinary record was made notwithstanding the loss of eight shifts altogether.

The lower part of the Standard Iron Company's mill, at Wheeling, W. Va., was closed down on the 28th ult., and the balance of the mill shut down on the 3d inst. The work of repairing has already been commenced, and will be pushed as rapidly as possible, but it will probably be a month before all the departments are again on in full.

The Lidgerwood Manufacturing Company, of Chicago, Boston and New York, has just opened a branch house on North First street, Portland, Ore., in charge of Mr. Joseph M. Arthur. A stock of all sizes of its hoisting engines will be carried, so that customers in that locality will now be enabled to deal directly with the manufacturers.

Messrs. William Simons & Co., the well known dredger builders of Renfrew, Scotland, have just furnished one of their patent hopper dredgers to the Japanese government. The engines are triple-expansion, and when fully loaded the vessel exceeded the contract speed by nearly 1¼ knots. This firm is furnishing two sea-going dredgers for the harbor works of the Nicaragua Canal.

Articles of incorporation have been filed in Camden County, N. J., Clerk's office, by the Eastern Steel Company. The objects of the corporation are to manufacture compressed steel castings. The capital stock is $100,000. The corporators are Sorene C. Rockman, Henry C. Terry, George Butler and Matthew D. Johnston, all of Philadelphia, Pa., and Lewis C. Starr, of Woodbury, Pa.

About 500 iron workers in the New Jersey Steel & Iron Company's mills at Trenton, N. J., refused to go to work on the 15th inst., because the company declined to sign the scale of the Amalgamated Iron Workers' Association. The strike is being conducted under the guidance of the Knights of Labor and the Amalgamated Association. The leaders held a meeting, and decided to continue the strike until the scale is signed.

The New York Central Iron Works is the name of a new stock company which has been formed by Mr. W. B. Dunning, of Geneva, N. Y. The object of the company is to manufacture Mr. Dunning's patent steam and hot water heaters and wrought iron boilers, and its capital is placed at $100,000. Among the stockholders are: W. B. Dunning, S. K. Nester, L. D. Collins, O. J. C. Rose, P. N. Nicholas, E. N. Squires, C. H. Huke, James R. Vance, S. H. Ver Planck, S. E. Smith, M. S. Sandford, D. E. Dempsey, W. G. Potter, P. Prouty, A. L. Chew, Wm. Bowker, Geo. W. Johnson.

Numerous experiments were made last week at the Edgar Thomson Steel Works, Braddock, Pa., upon an invention to recarbonize the steel after the first carbon has been blown out in the converter, with coke dust. By the present method there is run into the pure steel 2,560 pounds of spiegel, which contain sufficient carbon to carbonize ten times as much steel to a medium carbon point. According to the new plan, coke dust will be poured into the ladle while the heat is passing from the vessel into it, and as the coke is nearly pure the carbon will mix. The two inventors, who are foreigners, are superintending the experiments. It is said to have worked successfully at Homestead, where open hearth steel of low carbon is made.

CONTRACTING NOTES.

A steel arch bridge, with a draw of 460 feet, will soon be built across the Mississippi River at Winona, Minn. It will be used jointly by the Chicago, Burlington & Northern, the Winona & Southwestern, and the Green Bay, Winona & St. Paul railroads. The contract calls for the completion of the bridge by March 1, 1891.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

942. Machinery for electric light and waterworks. Georgia.

943. Second-hand boiler and engine of from 25 to 35 H. P. South Carolina.

944. Full line of planing mill machinery. Tennessee.

945. A 15,000,000 gallon steam pump with all necessary appliances and boilers. Later, other supplies for new water-works. Georgia.

946. Correspondence with manufacturers of castor bean hullers. New York.

947. Information in regard to foundry equipment, cupola, etc. Texas.

948. Everything necessary for a complete system of water-works.

949. A 20 H. P. stationary, tubular boiler, and a 9x10 engine. Kentucky.

950. Correspondence with manufacturers of pipe, stand pipes, pumps, engines and hydrants, for water-works. South Carolina.

951. 1,500 feet 15-inch glazed sewer pipe; 2,000 feet 12-inch sewer pipe; 500 feet 16-inch iron pipe. Georgia.

952. Boiler, 6 to 12 H. P. Georgia.

953. Quotations on ice factory machinery Georgia.

954. Outfit for ice factory, also steam laundry. Georgia.

955. Prices on excelsior machinery. Alabama.

963. Forty tons of 16-pound steel T rails and two street railway passenger coaches. Tennessee.

964. Elevators, bolts, anchors, pulleys, steam heating apparatus, and boiler for five story building. North Carolina.

965. Latest improved machinery for crushing gold quartz and saving the gold. Michigan.

966. Stand-pipe, 15 x 18 feet. 25 H. P. boiler, and one or two pumps capable of raising 300 gallons of water per minute from 124 feet below the surface up into stand-pipe. May also want a few miles of mains. Alabama.

967. Ice machinery. North Carolina.

968. Saw and planing mill of 2,000 feet capacity, also machinery for door, sash and moulding factory. Florida.

969. Second-hand air compressor capable of transmitting 80 to 100 H. P. 4,000 feet.

970. Second-hand, double end street car with seating capacity for 16. Arkansas.

971. Five ton ice machine, complete. Georgia.

972. Engine, boiler, sugar cane mills, cotton ties and roofing. Alabama.

973. Head blocks and carriage for saw mill. Louisiana.

974. Machinery for canning factory with a capacity of 1,200 cans per day. Texas.

975. Machinery for manufacturing spokes, axe, hoe and rake handles. Georgia.

AMERICAN GOODS WANTED ABROAD.

932. Information concerning machinery for shelling castor-oil beans. Mexico.

933. Machinery for grinding up logwood or Brazil wood. Mexico.

956. Prices and particulars of latest improved machinery for large central sugar factories, par

ticularly boilers and centrifugal machines and turbines. Martinique.

957. Estimates for lighting streets of a city of 25,000 inhabitants, where water power can be supplied. Martinique.

958. Correspondence with manufacturers of brown coal or lignite briquette machinery. Australia.

959. Samples and prices of bags for shipping cocoanuts. United States of Colombia.

960. Machinery for extracting cocoanut oil. United States of Colombia.

961. Catalogue of strong, plain carriages, with seats for two and for four persons. United States of Colombia.

962. Correspondence with manufacturers of glassware, tinware, furniture (chairs specially), lamps and lamp chimneys. West Indies.

976. Machinery for manufacturing Portland cement-concrete tubes for sewerage and drainage purposes. Peru.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including July 9, were as follows:

	Tons. 1890.	Tons. 1889.
Marquette, Marquette District	496,286	568,136
St. Ignace, " "	15,499	19,155
Escanaba, " "	515,809	389,717
" Menominee "	775,098	650,949
" Gogebic "	115,596	105,575
Ashland, " "	886,542	539,385
Two Harbors' Vermillion District	281,931	325,725
Total, tons	3,086,761	2,598,642

The Executive Board of the United Mine Workers of America in session at Columbus, O., adjourned on the 17th inst., after adopting resolutions strongly favoring harmony of action with the Knights of Labor and regretting any differences that have previously occurred.

ARIZONA.

COCHISE COUNTY.

SILVER KING MINING COMPANY.—The superintendent's report for the week ending July 5th says: "In the 980 level the northeast drift is in hard porphyry, but the miners are making good progress. The total length is 83 feet. We advanced 20 feet. A force of four miners is employed. On the 1,100 level the northwest drift is in hard white quartz carrying no mineral. The total length is 50 feet, the advance being 13 feet. A force of four miners is employed. On the 1,400 level the crosscut running north from No. 1 winze is in soft porphyry with some clay seams running through it. The total length is 102 feet, and the advance is 20 feet. A force of six miners is at work. During the past week we have had two men down at the mill making a few necessary repairs before starting up. The millers will arrive on the 7th, and expect to start six pans and three settlers on the 9th." A telegram received by Mr. E. R. Grant, the transfer agent of the company, says that the mill started on the 10th inst., and is at work on the tailings.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.—The secretary of this company submits the following financial statement to July 1st:

Surplus, January 1st, 1890		$28,141.42
Gold bullion produced March		2,969.90
From Utica Mining Company for use of mill		542.52
Wood sold		1,004 00
Gold bullion produced April		5,055.63
" " May		6,010.37
" " June		7,572.05
Total		$51,325.29
January expenses	$3,975.05	
February "	3,762.57	
March "	4,293.19	
April "	5,075.63	
May "	6,443.17	
June " estimated	6,500.00	
		$30,049.61
Surplus		$21,276.28

The clean up was made earlier than usual, and the above product for June represents one week less than a full month. To this amount should be added about $2,500, to be received from the sulphurets when treated, making a total of over $10,000 for the time the mill was running (four fifths of a month).

This gratifying increase is owing to the better ore from the new discovery in No. 2 level being mixed with the lower grade of No. 3, on which the mill has been running.

We are about to resume prospect work. The superintendent is confident of finding still other ore bodies and of large value.

COLORADO.

CHAFFEE COUNTY.

TIN CUP.—The ore recently struck in this mine is said to average $1,000 a ton. If the streak just discovered is continuous in depth to the usual extent of contact veins, there is more gold in the camp than has been discovered since the days of the Pike's Peak excitement. The quartz is a light color, while free gold is plainly visible. From an assay made of the iron ore at Aspen, it was found to run $28 per ton in gold besides iron. Tin Cup years ago was a prosperous camp, but was abandoned owing to the enormous expense of shipping ores to concentrators and smelters.

LAS ANIMAS COUNTY.

The sale of a large body of coal near Apishapa is reported. The track comprises 2,000 acres and was sold to Boston parties, who will at once commence improvements that will cost $50,000. The price paid for the land has not been made public, but it is said to be a handsome amount over the government price.

SAN JUAN COUNTY.

(From our Special Correspondent.)

SILVERTON, July 12.

SAMPSON MINING AND MILLING COMPANY.—This property, owned by Cleveland, O., and New Haven, Conn., men is located near the head of Cement creek, about nine miles from Silverton, on Bonita mountain, at an altitude of nearly 12,000 feet. It was discovered in 1880, and subsequently fell into the hands of a company, then through the legal mill into the possession of the present company. The mine underwent the usual complications of rich properties, and finally in 1886 closed down. In the meantime a 25-stamp mill had been put up, and a tramway, costing about $15,000, erected from mill to mine, a distance of 3,300 feet. On mill, tramway and mine, probably $100,000 have been expended, while the output is said to have exceeded $200,000.

During these years of idleness mine and mill have been vandalized, and a valuable property shamefully abused. It is a gold bearing true fissure vein, with enormous outcroppings, in places 50 feet in width, of nice white quartz, free from base metals. The great mass of the ore is low grade, but it appears to be in such vast quantity that one would suppose it could be mined and milled at an enormous profit. Negotiations are pending for a bond and lease of the property, and the old-timers here hope to see the Sampson again in the field of profitable producers.

SUNNYSIDE EXTENSION MINE.—Four years ago this mine was only a prospect. With limited development it has already produced over $300,000, and is producing now at the rate of $15,000 per month. The vein varies from four to eight feet in width, much of the ore is extremely rich in gold and silver, and there are vast bodies of low grade ores. Twenty to 25 men are breaking rock in the mine, and 35 to 40 are employed in the aggregate on the property. The daily output amounts to from 40 to 50 tons, and the amount can be increased to 60 tons, with little additional expense. The mine is at an altitude of nearly 13,000 feet, but the men experience very little inconvenience from the rarefaction of the atmosphere.

Last season, Rasmus Hanson, the proprietor of this splendid property, completed and put in operation a 20-stamp mill, and it is now pounding away day and night. It requires about a dozen men to keep it in motion, its capacity is from forty to fifty tons in twenty-four hours. It is pronounced one of the best mills in San Juan County. In addition to the stamps the mill contains a Blake crusher, having a daily capacity of 150 tons, six bumping tables, automatic feeders, 60-horse power engine, heavy boilers and other machinery. In the near future it is Mr. Hanson's intention to put an electric plant for power and for light in mill and mine, and a tramway is to be built connecting the two, which will be 2,600 feet in length. Thus in due time these properties will be in shape to produce more largely, constantly and far more profitably. A wagon road extends from Silverton to the mill, a distance of fifteen or sixteen miles, and six and eight-horse teams haul up enormous burdens.

SUNNYSIDE GOLD MINE.—This property is only a little more than a mile over the mountain to the east. It is now being worked on a lease by two or three members of the original company. There is a 10-stamp mill on the property, and twenty or twenty-five men are employed there. It is doubtful if any man knows how much the mine has produced. A great deal of secrecy prevails in connection with many of these rich gold properties. The Sunnyside vein is a broad true gash in the mountain, and has been traced for 10 or 12 miles. It is supposed to have produced $250,000 or $300,000. There has been some dissension among the members of the present company, but affairs may be all serene now. At any rate the mine is highly productive, and it has the reputation of being very profitable.

SAN MIGUEL COUNTY.

GOLDEN GROUP MINING COMPANY.—This company of Telluride was incorporated recently. The consolidation embraces the Golden Group property, including the mill, the French Boys' group, which was bonded to John C. Rice, and the Mose Johnson group, bonded to E. H. Teats. The new corporation is capitalized at $500,000 in shares of $1 each, and it is stated that no stock is or will be offered for sale until after the property is placed on a dividend paying basis.

MICHIGAN.

(From our Special Correspondent.)

COPPER MINES.

CALUMET & HECLA MINING COMPANY.—This mine has now but eight shafts from which copper is hoisted in any considerable quantities, viz.: Nos. 2, 4 and 5 on the Calumet branch, and Nos. 2, 3, 9 and 10, 11 and 12 on the Hecla branch. The shaft numbered 9 and 10 for convenience is a double shaft, with two independent hoisting engines. Shafts Nos. 1 and 3, Calumet branch, were abandoned after the last fire on account of the closing in of the hanging. No. 2 was badly closed in, but has been cut down again. Most of its timber has been replaced, and soon a full force of miners can be worked to advantage.

Shaft No. 1, Hecla branch, has also been abandoned, and No. 4 has not been working for several years. Shafts No. 6, 7 and 8 are the new shafts between the old Hecla workings and the so-called Black Hills. Shaft No. 6 is down 2,700 feet, and is in excellent condition. There has been considerable ground opened out and but little stoping done at these three shafts. At present they are not doing much, but are waiting for the new combination rock and shaft houses which are going up at each of them. When they are completed the output of each shaft may be calculated at not less than 2,500 tons a week. These combination rock houses have been mentioned before in these colums, but it may not be out of place to describe the method of handling the rock. Directly from the shaft the rock will pass to the third story and dump on a screen conveyor. The rock remaining on the screen will be run through a very large Blake crusher, which will be located on the third floor. After passing through the large breaker, the rock drops into a smaller Blake breaker, and thence to the bins on the first floor, which are high enough from the ground to allow a train of rock-cars to pass under.

An engine will be placed in each rock-house, using steam from the boiler plant of the new hoisting engines. By the way, these wonderful hoisting engines have been built over a year and have never been put to the slightest use. To all appearances, there will be no real need of them for several months yet. The Frontenac engine, which formerly has done the hoisting for the Hecla branc, will be used for running a large compressor plant. For about a year it has used but one of its four drums, that one connecting with No. 2 shaft, Calumet branch. The removal of the idle machinery began this week. As soon as practicable, two large Leavitt compressors which have been on the ground for some time will be put in. As soon as the Red Jacket shaft strikes the vein and time is given to get the ground opened out there is no doubt that the mine could be made to double its output were the management so disposed.

CENTENNIAL MINING COMPANY.—The new shaft is down nearly to the 200 foot level and continues to hoist excellent copper-bearing rock. There is now in the stock pile considerably over 300 tons of very rich rock. None of it has gone to the stamps yet, but enough has been assayed to show that it will average three or four per cent. mineral.

IROQUOIS MINING COMPANY.—The result of explorations of the Kearsarge conglomerate have caused more than a ripple in mining circles. For several weeks they have been digging pits, locating the vein and ascertaining its width. Capt. Jack Richards, the foreman of the exploring party, says that the vein of rock is 70 feet wide on the surface. In one pit, about 300 feet from the north line of the Kearsarge property, the "top" of the vein is located. The pit is 14 feet long, and shows copper-bearing rock across the bottom that will go three or four per cent. mineral. If the copper streak is as wide as the vein rock and extends any great distance, Calumet & Hecla will have an equal. Many people are supposing that this new find is on the Calumet conglomerate. Not so; it is a conglomerate considerably different to the touch and to the eye. It is darker and more porous. Its outcrop is about 1,500 ft. east of the outcrop of the Calumet vein.

The Kearsarge people feel highly elated over the find as it extends across their property in such a way that their chances for a good mine are doubled if the find proves valuable. Their explorations on the Calumet vein showed a streak of copper about three feet wide at one place; up to Tuesday noon nothing better had been reported. This, however, is a nice thing.

PENINSULA COPPER COMPANY.—This company, at a meeting July 1st, at Boston, increased the number of shares from 40,000 to 80,000 and levied an assessment of $2 per share. This will give a good working capital and allow many needed improvements to be made. The new shaft on the Pewabic vein is down nearly ninety feet and is very promising. They tell me that every foot of rock taken out since they struck the lode has contained copper.

IRON MINES.

A press despatch says that one of the most serious mine cave-ins in the history of the Gogebic range occurred on the 14th inst., at the Aurora mine, near Ironwood, controlled by the Wisconsin Central Syndicate. The loss is said to be $200,000.

ARMENIA MINE.—This property shipped in round numbers 50,000 tons last year; does not count on more than 40,000 this.

DUNN MINE.—The original deposit has pinched up entirely, throwing the ore to each side, becoming a barren strip of 150 feet between the working parts of the mine. The Dunn is troubled severely by the irregularity of the deposit and the frequent intrusion of rock flows. Any calculation based on

present indications is very likely to be upset two weeks hence. The management is endeavoring to achieve the maximum output this year, and expects to reach the 200,000 mark before the first snow flies.

The shafts are hoisting at present, one being a vertical. The ore is rather apt to vary from day to day, but the boat loads run from 60-61 per cent. Fe.

Some ore of a quite high grade has been recently struck, but promises only to be a small vein.

A new engine house is in process of construction, and when completed will relieve their present cramped condition.

The winter stock pile is nearly exhausted. July will see the last of it off. The daily shipment will materially fall off after that, reducing their shipping quotations for the balance of the season.

The trouble experienced in obtaining ore cars on the Gogebic range is very little felt here. A very good ore service is extended to the mines by the Northwestern Railroad.

The preliminary surveys of the so-called "Schlesinger Road" have been run through to Crystal Falls, but it is exceedingly doubtful about any further work being done this year.

HEMLOCK RIVER MINE.—This mine is situated about 15 miles from Crystal Falls, the nearest railroad. Last winter a very neat hoisting plant and machinery were carried out on sleighs, and mining operations have commenced with a well organized force. A railroad extension has been surveyed through from the main line of the C. & N. W., and the contracts will be let in a few weeks, giving them an outlet for their ore before the close of navigation. They already have several thousand tons in stock. A large, well-timbered shaft is being sunk on the foot at an angle of 50 degrees to tap the deposit on the second level.

IRON.—The formation through the Crystal Falls district is by far the most disturbed of any of the L. S. ranges. Exploration work is uncertain and no dependence can be placed on the continuation of formation.

The dips, folds, faults and strikes change so unaccountably as to completely upset the most careful calculations.

The impetus given the region by the improvement in demand for lower grade ore during the winter has served to produce renewed activity in exploration.

A considerable increase in shipments cannot be expected, for the opening of new properties will merely serve to counterbalance the falling off in shipments from some of the older properties. The ore bodies accessible by open pit work in the older mines have been exhausted, and the resort to underground work has reduced their facilities for quick hoisting.

PAINT RIVER MINE.—This mine supplies a large amount of ore to the celebrated charcoal oven furnace at Ashland. Two working shafts hoist all this ore, which is now normally of a low grade, although a find recently discovered produces a 64 per cent. ore. The Monitor mine is working on the same deposit as the Paint and they both keep pretty close to the line.

YOUNGSTOWN MINE.—The immense undertaking of stripping, which is being carried on on this property is progressing rapidly, about 8 to 10 feet of the surface being already removed.

The strip to be removed comprises a tract lying between the railroad and the Paint River, 200 feet wide and 400 feet long, although it may be extended to 600 feet. The average depth of the surface material is 27 feet, composed of clay, sand and boulders.

About 40 teams will wheel scrapers, work both day and night shifts, the ground being loosened by immense breaking plows. The mine is worked under contract at present, but their time expires this fall, and the property will then change hands.

MISSOURI.

JASPER COUNTY.

(From our special correspondent.)

JOPLIN, July 14.

In the week ending last Saturday there was a heavy output of zinc ore, with an advance in price. Lead also rose one point and sold readily at $25.50 per thousand. The following are the sales of ore from the different camps:

Joplin mines, 1,376,810 pounds zinc ore and 209,440 lead; value, $22,430.

Webb City mines, 781,550 pounds zinc ore and 49,660 lead; value, $10,356.61.

Centerville mines, 782,040 pounds zinc ore and 54,820 lead; value, $10,792.80.

Zincite mines, 284,460 pounds zinc ore value, $3,102.45.

Lehigh mines, 43,540 pounds zinc ore, value, $594.

Galena Kans mines, 900,000 pounds zinc ore and 250,670 lead; value, $16,517.75.

Votal value, $63,793.61.

The Southwestern Electric Light and Power Company is pushing the improvements at Grand Falls as fast as possible, and will let a contract this week for a solid masonry dam across the creek, 1,000 feet long, which when completed will give the company almost unlimited power to furnish to the mines.

Frye & Sons, the veteran prospectors, have made another rich strike of lead and zinc on the Diamond property. They have two shafts down in the ore body, and in three days last week they took out and cleaned up 32,000 pounds zinc ore and 3,000 pounds of lead. Pay dirt was found within seven feet of the surface, and a one-half interest in the prospect has been sold to Kansas City parties for $4,200 cash.

Mr. P. Murphy has commenced prospecting his land in Murphy's Park with a drill.

Snyder Bros. are still in the lead as the largest producers of the week, they having turned in 278,740 pounds zinc ore and 32,180 lead.

Swartz & Brewer Bros., operating on the Taylor and Billingsley land, are opening up a fine body of ore and last week turned in 26,000 pounds of zinc.

Mr. L. B. Jones, of St. Louis, who owns a large tract of mineral land southeast of Joplin, called at the Joplin office of the JOURNAL Saturday with a party of St. Louis gentlemen who were taking a look at the lead and zinc mines.

E. St. John Noble, secretary of the Galena Business Men's Club, called on your correspondent and reports the mines of Galena all doing well.

IRKI LEAD AND ZINC COMPANY.—This company, at the old Pinkard lead mines, is opening up under Captain Nasbit's superintendence some new ground with very good prospects of lead.

LITTLE JOSIE MINING COMPANY.—This company on the Interstate land is working in a very large ore body from the 90-foot level, and has in six days taken out 40 tons zinc ore and 11 tons lead. Your correspondent made an examination of this mine last week and ascertained that the 900-foot level is being driven on top of what seems to be a large deposit of lead and zinc.

MEFFERD & KLOTZ MINE.—This property, recently purchased by Etary & Co., on the Interstate land east of the city, took out and sold last week $1,300 worth of ore.

THISTLE MINING COMPANY.—Miss Arnold, E. Loyd and Judge Spencer have recently purchased a tract of land near Sherwood. Miss Arnold has leased Loyd and Spencer's interest in 40 acres, and is organizing the Thistle Mining Company, and proposes to set aside a certain amount of treasury stock for prospecting and development work.

TRACY MINING COMPANY.—Dr. S. C. Price, secretary of this company, which is operating a lease on the Tracy land at Carterville, has prepared the following statement of the company's output for the fiscal year ending June 30, 1890. The output of zinc was 10,503,151 pounds, lead 427,755 pounds. The total value of the output as shown by the cash sales was $137,056.26. The average price received for lead was $22.25 per thousand, and for zinc ore $23.55 per ton. The output of zinc ore for the last six months of the year was 5,668,671 pounds, and 344,650 pounds lead.

MONTANA.

LEWIS AND CLARKE COUNTY.

MONTANA LIMITED.—The resident director reports as follows:

"With regard to the Empire, until a connection is made with the Cruse level, which will consume another two months' work, it is not possible to do much development from the 400-foot level, as the ventilation there is not good by any means, and we cannot possibly operate more than two or three machine drills. But, as far as the drift has been advanced, it has opened up an ore body which is of considerable extent, and of good average grade, and which justifies the opinion that the Empire mine is going to prove a most valuable purchase. It is without question the most important discovery that has been made during the past three years, and I look forward with the very greatest expectation to the developments made in this direction during the next six months, placing at our disposal by the end of the year a large body of high grade ore.

The 1,000-foot level from No. 2 shaft (northward).—The development on the new chute encountered in this level (northward of the No. 2 shaft) is scarcely of less importance than that made in the Empire. The ore body has now been opened up for a distance of nearly 500 feet, and will average not less than three feet wide, from which assays varying from $10 to $90 per ton have been obtained, and the northern extremity of the ore body has not been reached. Although it is improbable that this chute will go up for any great distance, as the vein in the 800-foot level was practically barren, we feel that we have every justification for looking for its continuance in the 1,200-foot level, which will be reached by the No. 2 shaft towards the end of July, and in which we shall be able to commence drifting some time in September. Should the developments in the 1,200-foot level prove this ore body to exist in equal proportions at that depth, it will again add a large tonnage to the ore reserves; and, taken in conjunction with the Empire, will place us in a better position than we have ever been in in the past."

The secretary of this company states that the following information has been received by cablegram from the resident director at the mine:

Total yield of ore crushed during June	7,047 tons
Yield from the three mills	$91,400
Working expenses for the month	56,300
The estimated number of ounces contained in returns by assay is—	
Gold	3,048 ozs.
Silver	24,341 "

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

CONSOLIDATED CALIFORNIA AND VIRGINIA MINING COMPANY.—The average yield of this company's bullion per ton last month was $15.42. The average assay value of the battery samples per ton was $22.52.

NEW MEXICO.

SANTA FE COUNTY.

SANTA FE COPPER COMPANY.—The following is the report of Capt. Daniell to the company:

A. S. Bigelow—Dear Sir: I could not sooner refer to Santa Fe matters, nor have I now the disposition to give you a detailed report on the mine. Regret that my former letter on same mine is not available, but will, I think, be able to make you understand the situation. The course of the "ore body," "pipe," "lenticular bonanza," whichever you choose to call it, is very nearly east and west, the incline shaft being sunk to follow it. Very little exploratory work was ever done beyond the lines of good ore, low grade material being practically worthless. The two flats or beds worked grew more silicious as depth was attained, rich ore being in smaller masses, but it does not follow that this is a permanent condition. What brought about the collapse of the institution was the encountering of the "fault," "wall" or "fissure" in the lower workings, when there was no reserve on hand, and apparently no one on the ground who understood a very common geological problem. If I remember rightly, I referred to the probability of some such occurrence, but I would not have thought that anything of the kind should be so misunderstood. I sketch for your benefit the situation. The ore body, in two layers, running into the mountain, irregular in outline and pointed east, or nearly so. Then the fault running nearly north and south. When the fault was encountered, one would expect that the incline shaft would be continued beyond it to determine the position of the ore body. Instead of this the extension of the incline was carried south in the fault of fissure. It is scarcely to be expected that the ore body will occur again in the same line as above, for the fault is well marked. It will be shifted north or south, I should judge, but I have no doubt of its continuation beyond the fault. As to the fault being a fissure vein, in one sense, yes, and opposite the ore bodies there will, no doubt, be found ore in it, but as a permanency in the way of copper production. no. Mr. McLaughlin has commenced sinking and found ore, some quite rich beyond the fault. It will not take long to determine if he has the main ore body or not. A drift has been started south, some 100 feet below the level of the tunnel or adit, and is now in over 100 feet beyond the line of worked area. In this there is good ore, and the prospect is quite flattering. The estimate is that 150 tons of good ore, 13 per cent., have been taken out, in drifting 45 feet. If this continues another opening lower down must be carried forward, and that proving satisfactory, you would have more ore in reserve than ever before. The mine has two chances. The finding of the ore body the mine has been worked on east of the fault, and discovering other ore bodies by extending laterally. There is in my mind no question about the first proposition. Outcrops opened south of your workings show that bodies of ore may be expected in that direction, and some of these may be important. The opening drifting south seems to bear out this idea. A very large mine at any point I would not look for, but as I see it the mine has not had a fair chance. Everything of apparent value has been scooped out as one would eat an egg. The bottom was reached when the fault was met with. I would push down east, and would, as fast as possible, prove what goes south. A favorable turn in this upper part of the mine would enable you to start the smelter and make returns. In this connection I would observe that an expenditure of $3,000 monthly, instead of $2,000, would enable you to accomplish twice the work underground in the same time, because much of the necessary expenses would not be at all increased. Of low grade ore there is a good deal. It stands in the mine in almost every direction, and there is a large quantity at the surface. This is a factor that must be considered, because, as you are situated, it is as well if there was no ore when the grade runs below the smelting standard. Concentrator and water question I did not consider, and I am not, on such a short visit, competent to give any opinion. I took it for granted you knew everything in this direction. There is much more to be said, but the gist of it all is in the foregoing. I will be glad to answer any further questions. My visit was very pleasant, weather favorable, and I got all the information I wanted regarding the mine. I would very much like to know that the two points I have referred to were pushed as fast as possible. Yours very truly,

JOHN DANIELL.

PENNSYLVANIA.

COAL.

DELAWARE, LACKAWANNA & WESTERN RAILROAD.—The Fuller Colliery, near Wyoming, operated by this company, which has been flooded for

over a year past, is now being pumped out preparatory to resuming operations. This will give employment to over 200 miners, laborers and boys.

LEHIGH VALLEY COAL COMPANY.—The Malthy Colliery at Wilkesbarre, owned by this company, which has not been in operation for over six years, resumed work on the 15th inst., giving employment to over 300 men and boys.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to July 11th, were as follows:

	1890. Gals.	1889. Gals.
From Boston	1,492,213	2,503,877
Philadelphia	69,595,790	66,824,664
Baltimore	5,407,204	1,898,349
Perth Amboy	7,103,081	10,074,497
New York	208,982,216	218,370,219
Total	292.580,504	299,671,606

FOREIGN MINING NEWS.

AUSTRALIA.

NEW SOUTH WALES.

The value of the minerals produced in New South Wales in 1888 was £3.879,908, as against £4,-780,366 in 1889, showing a net increase for the latter year of £900,458. The greatest increase was in the value of silver-lead and siver-lead ore, where an increase of £823,460 has to be chronicled. Next in importance comes coal, with an increase of £177,650; then gold, £116,970. Tin, copper and iron show decreases. The production of coal was 3,655,632 tons—by far the highest on record. Some idea of the development of the coal mining industry may be obtained from the fact that 10 years ago the production was only 1,466,180 tons. The production of gold was greater than for any year since 1883, viz., 119,759 oz.; while the production of silver-lead ore and bullion was valued at £1,899,197 as against £1,075,737 in 1888, £541,952 in 1887, and £294,485 in 1886. Since 1851, the total value of the gold produced in the colony has been £37,614,887. The highest value was obtained in 1852, when £2,660,946 worth was secured. Since the mining industry was established in the colony, the total value of the minerals produced has been £81,598,-113.

BRITISH COLUMBIA.

(From our Special Correspondent.)

NELSON, July 6.

EAST KOOTANIE DIVISION.

According to Mr. Fowler, the smelting syndicate's superintendent, the smelter at Golden will be ready for blowing-in by the middle of July or the 1st of August at the latest. The buildings are as follows: For roaster furnace, 70 × 80 feet; for two calcining furnaces and ore crusher 53 × 53 feet; coke shed, 53 × 13 feet; coal shed, 20 × 40 feet; ore house, 40 × 40 feet; receiving platform, 90 × 76 feet, close to a spur of the Canadian Pacific Railway. The plant was manufactured by Frazer & Chalmers, and consists of a Blake crusher, 14 × 24; a water-jacket furnace, 7 × 10, with a No. 4 blower, 33 × 72; sample crushers, etc. The motive power will be furnished by a 30 horse-power engine and 12 feet × 3 feet 6 inch boiler, manufactured in Toronto. Water will be obtained from the Kicking Horse River by means of a No. 6½ Knowles pump. The plant is intended to treat 40 tons of argentiferous lead ore daily, but the company will also purchase ores carrying a limited percentage of copper.

CARBONATE MOUNTAIN DEVELOPMENT COMPANY.—The Spallumcheen river mines are included in the property of this company. One of these, the Monitor, furnishes good smelting ore carrying from 44-77 per cent. lead, and 32-59 ounces in silver per ton. Another of their properties—the Southern Cross—carries $37 per ton in gold. The Carbonate Mountain ore is said to be similar to, and to occur under the same conditions as the Cœur d'Alene deposits. The smelter at Golden will afford an easy outlet for a time for these ores.

WILD HORSE CREEK.—Between Wild Horse and Sheep Creeks, about 52 miles east of Hot Springs, considerable excitement has been caused by the discovery of a new quartz ledge, carrying well in copper and silver (upwards of 100 ounces to the ton). The district is, in all probabilty, a rich one, for large quantities of good float rock are being found in several places. Hitherto the district has been almost inaccessible, but the government is now making a trail to follow the ledge round, and the railroad through the Crows' Nest Pass will run near the claim. A government trail is also being made up the Bluewater and from the character of the district important discoveries may be made any day.

WEST KOOTANIE DIVISION.

The fine weather has now set in, and nearly all the prospectors are out on the hills, attention being given chiefly to the copper-silver belt on Toad Mountain and the gold-bearing district between Eagle and Forty-nine creeks.

Outside parties seem to be fully satisfied with the progress made by the camp. At a government sale of lots here, on June 25th, 32 lots—the majority still covered with brushwood, etc.—brought the government a spot cash sum of $9,515.

The royalty clause in the "Act in aid of certain railways," passed at the last session of the legislature, is generally felt to be unjust and prejudicial to the mining interests of the district. The clause reads: "The lieutenant-governor in council may grant to the company" (viz., the Kootanie and Columbia Railway and Navigation Company) ". . . the right for 25 years from the completion of the railway, to exact and collect a percentage not exceeding five per cent. over and above working expenses on gold and silver extracted from ores which may be found upon any of the lands granted . . . to the company." An order in council should be made at once repealing this clause. The railroad from Nelson to Sproat—where connection is made with the steamboats on the Columbia River and the Arrow Lakes—is making good headway, and will afford a ready means of shipping ore from the Kootanie Lake to the Revelstoke smelter, but the land grant made the company by the government was a sufficient bonus for the construction of the road.

Mr. G. C. Tunstall, the gold commissioner for the West Kootanie division, visited Hot Springs and Nelson this week to decide where the wagon roads from the two towns to the mines are to start from. Arrangements are being made for the active prosecution of the work. Over $10,000 have been appropriated by the government for the two roads.

HOT SPRINGS DISTRICT.

The stage has been reached in this camp when steam hoists and pumps are a necessity for profitable working. The shafts of several claims from which pay ore could be taken are filled with water and cannot be worked without machinery.

BLUE BELL.—The tunnel which was started from the vicinity of the lake shore is now in over 700 feet, and the body of galena encountered is 89 feet 9 inches wide. It is stated that about $2,000 worth of ore is being taken out daily at the present time. The ore body carries very little gangue and averages $12 to $15 per ton in silver. This is undoubtedly the largest known body of galena in this part of the country. It will be remembered that this mine is owned by the New Haven Mining and Smelting Company, and is situated on the east side of the Kootanie lake, nearly opposite Hot Springs.

LITTLE DONALD.—The attempt to sink the shaft another 50 feet has been abandoned for the present, two horses on a whim failing to keep the water out. The owners (Davenport & Stevens) are getting in a hoist and pumps and will then proceed with the sinking. Although burdened with a charge of $50 or so for freight and smelting, this claim has more than paid all expenses from the surface.

NUMBER ONE.—The work now in progress which is producing some fine ore) is being done north of the old works. The country rock is grey limestone and, as might be expected, the ore is irregular and somewhat pockety in character. During 1889 one hundred and thirty tons of ore (averaging 85 ounces in silver and high in lead) were shipped from this claim. Lately ore has been found near the north boundary of the claim, the ore chute apparently running in a north-westerly direction.

SKYLINE AND KRAO.—Hoists and pumps are also being brought in for these claims. Stoping is being done on the Skyline, and first-class ore is being taken out. The ore in the Skyline occurs between limestone and argillite, the latter constituting the hanging wall. In the Krao claim the country rock is limestone, dipping S. 65 degrees W. at an angle of about 82 degrees.

TAM O'SHANTER.—This claim is situated about two miles north of the "Blue Bell" mine. It is the only place on the east side of the lake where native silver and ruby silver ore has hitherto been found.

NELSON DISTRICT.

DANDY.—This claim is the west extension of the Silver King claim, and is doubtless on the same lead. The ore body has been exposed throughout the length of the claim by six open cuts, and appears to be fairly regular in direction (nearly due east and west), size 3 feet to 3 feet 6 inches and character galena, copper pyrites, occasionally blende, and stringers of tetrahedrite rich in silver. The vein pitches southwardly at an angle of 79 degrees, carries a larger amount of quartz than the Silver King lead, and is inclosed between walls of schistose diabases. The tunnel now being run on the vein has been driven 36 feet, and shows 3 feet 6 inches of ore in the face. Sinking in the shaft will be resumed as soon as the snow water is less troublesome to handle.

EAGLE CREEK MINING COMPANY.—The 10-stamp mill is working steadily. The first clean up was made on the first inst., but the value of the bullion has not yet been made public. The ore is supposed to average about $30 per ton.

FORTY-NINE CREEK.—It is probable that hydraulic mining will be tried on this creek before long, and doubtless with satisfactory results. Placer mining was carried on here in 1867 (when coarse gold to the value of $6 to $18 per hand was obtained) and later. The gold excitement further north drew off the white miners and left the ground to Chinamen, who are taking a considerable quantity of gold dust from the creek at the present time. The bed rock has not been worked. Rich gold float rock was found near the creek this spring, but the efforts to discover the parent ledge have not been successful.

On the north side of the Kootanie River, near the railroad now in course of construction, the Ward Brothers have located a very large body of magnetic iron ore. The magnetic is said to run $9 in gold per ton, but this is probably too high an estimate.

KOOTANIE-BONANZA MINING COMPANY.—R. D. Atkins, an English gentleman, backed, it is said, by Messrs. Baring, of London, has the practical control of this property, and it is under his direction that the lowest tunnel (560 feet long) on the Silver King is being driven. Some of the steel rails for the tunnel track have already arrived, and there is every evidence that development will be carried on on a big scale. The result of the adverse claim suit for part of the property is not yet known here. The mines are looking as well as ever.

REVELSTOKE SMELTER.—The smelter officials who visited Nelson, Hot Springs and the neighboring camps last month report themselves well pleased with the appearance of the mines. They have made arrangements whereby 1,500 tons of ore will be shipped them immediately upon the completion of the railroad between Nelson and Sproat. Afterward an average supply of 50 tons per day can be relied on. The through rate from the Kootanie Lake to Revelstoke will be in the neighborhood of $8 per ton.

SUNDOWN.—This claim, about three miles southeast of Nelson, is showing up well for the small amount of work done on it. The tunnel is in only 30 feet—vertical depth about 20 feet—but the ore body is about three feet wide. Eight inches of this averages over $200 per ton in gold. Until quite lately the ore, a milky quartz carrying iron pyrites, was being thrown on the dump as too low grade. The tunnel is now being driven into the hill and ore is being sacked for shipment.

TRAIL CREEK.—It is reported that a Frenchman has discovered a well-defined ledge over 40 feet wide on Trail Creek, about 20 miles down the Columbia River from Sproat. The ore carries gray copper, and is worth, so it is said, $40 per ton.

CANADA.

NOVA SCOTIA.

(From our Special Correspondent.)

COAL.—During the past week there is little new to be reported. The continuance of the strike at Springhill has kept the Pictou collieries running full time. In Richmond County, Cape Breton, explorations have shown the structure of part of the inhabitants' coal basin, and a seam about 3 feet thick has been traced several miles.

ANTIMONY.—Mining has been discontinued temporarily at this mine, at Rawdon, and the large dump of second-grade ore is being overhauled and shipments made of culled ore.

GOLD.—New discoveries of gold bearing veins are reported from the Rawdon district. The latest returns from South Uniacke show 503 ounces from 36 tons of quartz. Work continues steady in Queens County, at the Malaga, Whiteburn and Brookfield mines, but is not as brisk as usual in the districts lying east of Halifax.

COPPER.—Some work is being done at the Coxheath mine of the Eastern Development Company at the shafts and on the new vein found last fall. The directors and a party of capitalists are shortly expected at the mine.

PROVINCE OF ONTARIO.

(From our Special Correspondent.)

PORT ARTHUR, July 14 1890.

The iron located by Mr. A. Lougheed P. L. S. on the Black Sturgeon River, referred to in my last letter, is situated 35 miles from the mouth of the river on Black Bay. Mr. Lougheed pronounces it to be red hematite of a first class quality assaying 64 per cent. and free from impurities, it outcrops in three different places along the strike of the lode, the most northerly outcrop being 1¾ miles in length, and 200 feet wide in places. The next outcrop south is one mile in length, and the average width of the exposure is 50 feet; on the most southerly location no iron was found in place, but large quantities of float of a good quality. There is no capping of Jasper or otherwise excepting in a few places a slight depth of red gravel. The three locations consist of 1,740 acres, and are plentifully supplied with Norway pine, spruce and tamarac, and their position on the Black Sturgeon guarantees the water supply.

Mr. Lougheed estimates that there is a sufficient quantity of ore in sight to warrant the building of a railway to the ore; it was taken up for Detroit capitalists. Messrs. Quigley and Hammond, of Fort William, have located some iron lands 30 miles west of Port Arthur, and 5 miles south of Finmark station, on the Canadian Pacific Railway. The outcrop is continuous for about one mile and a half, and has an average width of 35 feet. The ore is magnetite. Assays by F. Hille, M. E. and Ch., Port Arthur, gave the following result: 61 per cent. metallic iron. The convenient situation to a railway and the short haul necessary to bring it to deep water at Port Arthur ought to make this property a very valuable one.

Reports, more or less accurate, continue to come in of rich finds of silver-lead and gold in the district east of Port Arthur, near Schreiber and

Jackfish Bay. Some of these no doubt will prove to be without much foundation, like many other stories of the kind brought in from comparatively new districts: but others are well authenticated by tests and examinations made by competent men. The country rock is Huronian. All the veins so far as known have a good width, and are apparently of a lasting character. Supt. Shear, of the Badger Silver Mining Company, has surveyed and patented a silver-lead vein, 1½ miles from Schreiber, last week. The vein is ten feet wide, running through the granite, and carrying on the surface zinc blende and fine-grained galena. Assays by Charles Brent, M. E, Ch., Port Arthur, gave 18½ ounces of silver, $2.50 gold and 25 per cent. of lead to the ton of 2,000 pounds. This vein is crossed by an immense quartz vein, showing traces of gold on the surface. The location is very conveniently situated near the railway (1½ miles), and on the shore of Schreiber Bay, Lake Superior. W. Roland, M. E., has had a force of miners at work for the past three weeks at Terrace Bay, half way between Schreiber and Jackfish, on a property owned by Capt. McGee, of Toronto. It is a gold property and is crossed by eleven veins, I understand. The tests made by him are very satisfactory; will give you the particulars at a future date. I paid a visit this week to the Beaver, Badger, Porcupine and Silver Creek group of mines, and through the courtesy of Superintendents Hooper and Shear was shown through the works and mills. I am convinced from the production of the developed veins and the splendid showing made with little expenditure of money on the new discoveries that this is one of the richest silver districts in America, and all that it requires is the necessary capital with which to thoroughly explore and develop the great mineral wealth hidden beneath the surface. One would think to look at the several veins of the Beaver and Badger mines that capital could not be kept out, but the fact remains that it is slow coming in; one very gratifying feature is that all those who have invested their money have received, in nine cases out of ten, handsome returns on their outlay. Its history in this respect is excelled by none, either in the East, West or South; experienced mining men from Montana, Utah and other western mining States, unhesitatingly declare the prospects to be better, more varied in extent and richness, than anything offered in the mining camps of the West, and in their opinion all that is required to make this the great silver producing center of America is capital judiciously and intelligently expended in opening up and developing the silver lodes.

The Ontario mining laws are of the most liberal kind, offering every inducement to prospectors, to enable them to acquire absolute titles to their discoveries at a very modest cost. The Port Arthur, Duluth & Western Railway has its rails laid and trains running from Port Arthur to the crossing of the Kaministiqua River. From that point on to Whitefish Lake, a distance of 25 miles, grading is being vigorously pushed, and the management expects to have the road ironed and regular trains running that distance by October 30th next; from that point on to Gunflint Lake, at the international boundary, work will be pushed during the winter.

At Whitefish Lake the road enters the iron fields, and its advent cannot fail to bring about the development of the immense iron deposits of that region. Iron experts who have recently examined these deposits, have told me that they have recommended that development work be proceeded with at once, so as to anticipate the arrival of the railway. The nature and formation of the deposits are such that the ore can be mined and shipped at a minimum of cost.

BADGER SILVER MINING COMPANY.—Another rich discovery of ore was made on this property at 2:30 P. M., 12th inst., in running a cross-cut from No. 3 adit on the west side of the hill. This adit was run in on the course of the old or No. 1 vein; the adit was continued for 134 feet, and a cross-cut run north for about 50 feet when the vein was encountered. It is, undoubtedly, the old vein, as its character, dip and strike, correspond. The point of discovery is distant about 2,000 feet from No. 1 shaft and will give the company an immense body of ground to develop on this vein. At the time your correspondent visited it only one shot had been put into the vein, and about 200 pounds of ore, that would average 700 ounces of silver to the ton, were taken out. Its course westerly will bring it in contact with No. 2 vein, a short distance farther on. At No. 2 vein the westerly drift is in 50 feet, and the easterly 52 feet. The ore is very high grade and of a uniform quality with that taken out of the shaft. The vein has the same width and dips northwesterly along both levels.

In the adit started in to intersect the shaft, as reported in my last, the vein was encountered at the contact of the rock, 140 feet from the mouth. It appeared to stand up in the clay in a comb-like form, and carries at the point of opening 100 ounces of silver to the ton, composed of heavy argentite, black blende and galena. The vein is 3½ feet wide in the adit, and disappears under the floor down over the slope, and extends, in all probability, at least, as far as Silver Creek. It is safe to say that the Badger people have 3,000 feet of this vein on their property. When the fact that at every point at which it has been opened it has been found to carry such remarkably rich ore is taken into consideration, they may be said to have one of the best veins, if indeed it has an equal in America. They are taking out 25 tons of first-class mill ore daily, besides barreling the high-grade ore, of which they now have 12 barrels. No. 2 is a remarkably healthy six-weeks-old youngster. As to No. 3 (Porcupine) vein, they are drifting on No 1 level and sinking in No. 1 shaft; it is all good mill rock averaging about 125 ounces to the ton. The shaft will be sunk deep enough to connect with No. 1 adit The adit is in 210 feet; its continuation to the shaft will make it 810 feet in length. The mill is putting through 35 tons daily, the five-head battery of stamps doing about 15 tons and the Krause atmospheric stamp stamping 20 tons daily. This is the first Krause stamp erected on this shore and it is giving the greatest satisfaction; it keeps four Frue vanners constantly going. Supt. Shear has just had one of the Krause separating tables placed in position; it is capable of separating 9½ tons of pulp direct from the stamp daily; it is claimed to be a great improvement on the Frue vanner, as it has a greater capacity, separates the concentrates into different grades and will save the fine silver better. These stamps and tables are manufactured in Port Arthur.

BEAVER MINING AND MILLING COMPANY.—Capt. Hooper has had two more of his slow-motion vanners placed in position in the mill. This makes seven in all, four Frue and three Hooper vanners. They are giving remarkably good satisfaction. The concentrates from the Hooper vanners being higher grade than the Frue concentrates. Work in the mine is proceeding as usual. Mr. Frank I. Hecker, of Detroit, one of the owners, is on a visit to the mine. Everything is being conducted in a quiet, unostentatious way, and has every appearance of lasting prosperity.

SHUNIAH WEACTRU MINES COMPANY.—Superintendent Thompson, continuing the exploratory work on this property, has discovered seven new veins within the past two weeks, on three of which some work has been done, one with very satisfactory results. This vein is situated south of the main vein, carries argentite and black blende and assays 1,400 ounces silver to the ton. Fifteen barrels of high grade shipping ore are on hand but will not be shipped out till a car load is ready.

SILVER CENTER MINING COMPANY.—This company, of Ontario, has been incorporated by S. C. Duncan-Clarke. John Flett, Henry Lowndes, Robert McLean, S. I. Dawson, M. P.; George A. Shaw, O. H. Howland, Thomas Claxton, R. Caddick, George Dunstan and Edward Gordon, to acquire and hold mining lands in the Port Arthur district; to develop the said lands by working mines, smelters, stamping mills, and other necessary works. The capital stock is $300,000.

DIVIDENDS.

Alabama Coal and Iron Company, dividend of two per cent. on the capital stock, payable August 1, at the office of W. S. Gurney & Co., No. 31 Broadway, New York City. Transfer books close July 15 and reopen August 2.

Daly Mining Company, dividend No. 40, of 25 cents per share ($75,000), payable July 31st at the office of Lounsbery & Co., Mills Building, New York City. Transfer-books close July 26th and re-open August 1st.

Eureka Consolidated Mining Company, dividend No. 86 of 25 cents per share, payable August 5 at the office of Messrs. Laidlaw & Co., No. 14 Wall street, New York City. Transfer books close July 28 and reopen July 31.

Homestake Mining Company, dividend No. 144, of 10 cents per share, payable July 25, at the office of Lounsbery & Company, Mills Building, New York City. Transfer-books close July 19th and re-open July 26th.

Ontario Silver Mining Company, dividend No. 170, of 50 cents per share (75,000), payable July 31st at the office of Lounsbery & Co., Mills Building, New York City. Transfer-books close July 26th and re-open August 1st.

Quincy Mining Company, dividend No. 44, of $5 per share, payable August 18th, at the office of N. H. Daniels, 35 Congress street, Boston, Mass. Transfer-books close July 23d and re-open August 19th.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of Sale.	Amn't per share.
Belcher, Nev.	40	June 27	July 31	Aug. 21	.50
Bodie, Cal.	12	June 16	July 22	Aug. 22	.25
Big Hole Placer, Utah	....	May 28	July 2	July 21	.01
Con. Pacific	12	June 21	July 28	Aug. 20	.10
Crocker, Ariz.	9	June 16	July 25	Aug. 15	.15
Dexter, Nev.	1	May 29	July 1	Aug. 1	.08
Golden Prize, Nev.	4	June 19	July 30	Aug. 18	.25
Mayflower, Cal.	47	June 7	July 10	July 31	.30
Silver King, Ariz.	3	June 9	July 17	Aug. 11	20
Standard Con., Cal.	3	June 2	July 15	Aug. 9	.50
Teirakoff, Cal.	4	June 9	July 26	Aug. 23	.01

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Minneapolis, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 91 and 92

NEW YORK, Friday Evening, July 18.

It is with pleasure that we announce a change in the usual tenor of our weekly review of the mining market. There has been some improvement over last week, and more inquiry for stocks, both from outside investors and from insiders. It is said that one broker has received letters of inquiry from people alleging to be neophytes in mining investments, a fact which the recipient of the letter did not lose time in announcing.

It must not be imagined, however, that the week has been a remarkably active one.

We do not wish to throw cold water on the hopes of dealers in mining stocks, but it can not be denied that there is still room left for improvement, and a great deal of it. When one of our dealers points to the fact that there has been trading in high-priced stocks, such as the copper, and says it is indisputable evidence that we are on the verge of a boom, we cannot go quite so far as to agree entirely with him.

The outlook is promising, but there is no indication of a coming "ooom." Legitimate mining, and *it* only, will bring prosperity to our Exchange. Brokers are beginning to recognize the truth of the oft-repeated statements to this effect made by us, and see that by following our advice and discarding methods that savor of illegitimate transactions they will be gainers in the end. We hope the activity of the past week is more than a spasmodic spurt.

Several well-known members of the Exchange have gone West to spend their vacation in visiting mining camps and inspecting mines in whose stocks they have been accustomed to deal. We have no doubt that they will return impressed with the ever-growing prosperity of the mining industry of this country, and trust that they will be in favor of using sensible methods in promoting business in mining shares.

The sales during the week aggregate 123,023 shares, against 68,048 for the previous week, an increase of nearly double.

The Reward Mining and Smelting Company has made application for listing its stock at the Consolidated Stock and Petroleum Exchange. This company was incorporated on May 17, 1884, under the laws of the State of Maine. It was organized for the purpose of buying, selling, leasing and working mines, and has an authorized capital of $500,000, divided into 50,000 shares of the par value of $10 each. The stock is not assessable and is fully paid. The location of the principal office is Portland, Me., and the transfer office is in Boston, Mass., Henry M. Rogers being the transfer agent. The officers are Wm. W. Nichols, of Boston, Mass., president; Henry M. Rogers, Boston, treasurer, and Clarence Hale Portland, Me., secretary. The directors are W. W. Nichols and Henry M. Rogers, of Boston, and David E. Saunders, of Salem, Mass. The property is located in Pinal County, Ariz., and consists of the Reward mine. The metals produced and mined for are silver and copper. The present company has not expended anything for mine development, but the former owners spent about $25,000. So far as we can see from the application of the company, it has no milling or mining machinery, and there are no men employed at present at the mine. There are about 300 tons now on the dump, the average value of which, ascertained by assay test, is $50 to $1,600 per ton. The cost of mining is given at $2 to $3 per ton.

The company proposes to put a smelter near the mine. The treasury stock, 15,000 shares, is now offered at $5 per share to raise working capital for the purpose of development and the erection of a reduction plant. The papers of the company are now in the hands of the attorneys of the Exchange.

The copper stocks have once more come to the Exchange, and this week the transactions in them have been larger than for some time past. In Atlantic, 150 shares sold at $1.25; Calumet & Hecla, 30 shares at $306.25@$309.12½. Franklin has a solitary transaction at $24.13. Kearsarge was dealt in at $26.13; Osceola shows sales of 50 shares at $44.88. Quincy also shows transactions at $125.50. Tamarack advanced during the week, opening at $207.12½ and closing at $210.75, with 20 shares sold. Of Allouez 100 shares at $9.25 changed hands. The same is to be said of Huron at $9.25, assessment paid. Santa Fé shows the largest transactions so far as number of shares is concerned, 700 having been disposed of at 70 cents each.

The Comstocks were not neglected. In Alta 400 shares sold at $1.30@$1.35. Best and Belcher opened at $4 and closed at $4.20. Bullion declined during the week from $3.60 to $3.40. Chollar had a solitary transaction at $4.10. Commonwealth shows one sale at $3.20. Of Comstock Tunnel stock 1,900 shares at 17c. to 19c. were sold, and 1,000 of the bonds at 24c. were also disposed of. Consolidated Imperial was stationary at 55c., as was also Exchequer at $1.25. Julia fluctuated during the week, 14,000 shares having been sold at from 45c. to 50c. Justice was quiet at $1.85@$1.90. Kingston and Pembroke sold at 70c. Mexican was dealt in at $3.10@$3.35.

Occidental advanced from $1.30@$1.70. Oriental

and Miller shows moderate transactions at 6@7c. Overman was quiet at $3. Potosi had a single sale at $3. Scorpion advanced from 40@45c. Sutro Tunnel 1,000 shares changed hands, the price during the week advancing from 8@11c. Utah, 900 shares at $1.15@$1.25. Argenta was quiet at 13c. Confidence, 200 shares at $8.63@$8.88. Consolidated California and Virginia, 1,875 shares, the price declining from $4.50@$4.25. Crown Point had one sale at $3. Eureka Consolidated was stationary at $4. Gould and Curry was quiet at $2.60. Hale and Norcross was dealt in at $3.40, as was also Independence at 30c., Martin White at $1.10@$2, Mount Diablo at $2.25, Ophir at $4.50@$4.65, Savage at $4.35@$4.50, Sierra Nevada at $3.25@$3.60, and Yellow Jacket at $3.20@$3.25.

Of the Tuscarora shares Belle Isle sold at $1.10@$1.60. Navajo shows one sale at 73c. North Belle Isle was not dealt in. Commonwealth was quiet at $3.20, and North Commonwealth, 100 shares at $2.85.

More Colorado stocks, so far as variety is concerned, were dealt in this week than has been the case for some time past. La Crosse sold at 6 and 7c., 2,800 shares. Adams advanced during the week, opening at 95c., and at the close selling at $1.20. Breece at 50@53c., 1,100 shares. Dunkin was dealt in at 55@57c. Freeland shows transactions aggregating 10,100 shares at 40@48c. Iron Silver was quiet at 55c. Leadville Consolidated shows sales aggregating 17,200 shares at from 15 to 17c. Silver Cord 2,100 shares at 27 @30c. Small Hopes, 1,900 shares at 90c. and 91c. Robinson Consolidated advanced from 45c. to 50c. with sales during the week of 1,700 shares.

Bodie Consolidated was stationary at $1. Bulwer was dealt in at 30c. Mono advanced from 65c. to 75c., and at the close sold at 70c. Quicksilver Preferred shows sales aggregating 850 shares at $39.50@$41; Common was not dealt in. Standard, assessment unpaid, sold at 9@12c., and assessment paid at 70c., 2,370 shares of this stock were sold. Transactions in Astoria foot up 4,900 shares at 3@5c. Bechtel was dealt in at 22@25c. Brunswick at from 75c. to 72c. is reported in the official list to have sold 10,600 shares. Sutter Creek declined from $1 to 95c., but rallied and at the close sold at 97c. Tioga visited the Exchange, and 700 shares changed hands at 18@20c.

Of the Dakota shares Caledonia was dealt in at $2; Deadwood Terra at $1.40, and Father de Smet at 32@40c. Homestake also appears on the list with one sale at $10.25.

Two hundred shares of Minnesota Iron Company were sold at $86.50.

Boston & Montana, which has long been a stranger to the Exchange, was dealt in this week at $64.25.

Phœnix of Arizona, was firm at from $1.30@$1.40, and sold 12,900 shares.

El Cristo was quiet at 94@85c., the last being the closing quotation.

Santiago was dealt in at 50c.

One thousand shares of Shoshone were sold at 2c.

Holyoke has a solitary sale at 4c.

Horn Silver was strong during the week at $3.30@$3.50, and was traded in to the extent of 3,500 shares. Silver Mining of Lake Valley was stationary at 67c.

Mutual Smelting and Mining Company 2,300 shares, the stock advancing steadily from $1.55 to $1.70.

Boston. July 17.

[From our Special Correspondent.]

The market for copper stocks seems to have drifted into midsummer dullness, the sales for the week hardly coming up to the daily average a few weeks ago; at the same time there is a strong undertone to the market which keeps prices from going off to any great extent, and we believe that with a little more activity, coupled with some large orders, the whole list will soon recover, and higher prices than we have seen yet will prevail. Ingot copper is very strong and in good demand, and is not likely to decline while the production does not keep pace with the consumption, in fact many are of the opinion that copper will sell at 20c. before the year closes, which means much higher prices for all the producing mines and will stimulate speculation in the whole list. There has been but little gossip the past week relating to the situation of the several mines who are searching for the Calumet & Hecla vein, but such as comes from the Centennial, Kearsarge and Allouez is of a favorable character, and it is expected that it will be only a matter of a few weeks when these and several others in the near vicinity will have evidence of a character sufficient to warrant further expenditure of money to develop them.

In the market we note Allouez having declined to $8½, but all the stock offered at about that price was quickly taken, and to-day on good buying orders it advanced to $9 and closed very strong.

Boston and Montana sold up to $64¾, although at one time it was heavy at $63¼. The silver production of this mine is getting to be quite an item in its assets, showing a steady increase. The product for June was 26,093 ounces against 24,399 in May and 19,239 in April.

Calumet & Hecla seems to have steadied down to about $310, although some sales were made this week at $304. The condition of the money market has some influence on the price of this stock, as it can be used as collateral for loans.

Kearsarge declined to $24½, which is $10 below the highest price at which it sold on the recent boom. This is a more reasonable basis for the stock under its present stage of development, but it may in the not very distant future be worth a great deal more money, in fact this whole group of mines possesses great possibilities which time alone will determine.

Osceola has been rather more active the past week, some stock coming out as low as $44. It recovered quickly, and sold to-day at $45¼. Capt. Daniell, in a letter received from him to-day in answer to an inquiry as to how many years' reserves the mine has, expresses the opinion that without sinking the mine any deeper there is from five to six years' ore in sight.

Quincy declined to $120, but rallied again and to-day sold up to $126.

Tamarack sold down to $205 and up to $210.

Franklin is slightly firmer, selling up to $24, and in fair demand, although very little stock is offered in the market.

Atlantic was a little heavy and inclined to go lower. Sales at $25½ and $24¼.

Huron has sold in a small way at $8½ to $9¼, assessment paid.

National sold at $1¾ to $2.

The fancy stocks have wilted under the extreme dullness of the general market, and the transactions in them have been very light. Santa Fe is steady at 70c., all the sales being at that figure. Arnold declined to $1.50. Washington sold at 45c. There are not many of these stocks offered in the market, and a few good buying orders would set them all on the upward track. They will have their turn when the market begins to move again.

There has been quite an active market in Breece mining stock; sales early in the week were made at 40c. and gradually advanced to 62½c., which seems for the present the top price. This is one of the group of iron and silver mines near Leadville, Colorado, and has been more or less dealt in, both in this city and New York. Orders to buy from the latter city is said to be the cause of the advance.

Catalpa, declined to 35c., and Napa quicksilver to $5.

3 P.M.—Allouez sold at $9, Osceola at $45½, Centennial at $36, Boston and Montana, $63¾, and Quincy at $126.

Calumet & Hecla declined to $305 on sale of five shares.

By Telegraph.—Calumet and Hecla, $311; Tamarack, $216; Osceola, $45¾; Boston and Montana, 64¾; Kearsarge, $28½; Atlantic, $25¼; Centennial, 37¼ bid and 38 asked; Franklin, $23½; Allouez, $9¾; Tecumseh, 7½.

Denver. July 14.

Prices and sales during the week ending July 12th, 1890:

Company.	Opening.	H.	L.	Closing.	S.
Alleghany, Colo	16	16½	16	16½	1:0
Amity, Colo	05¾	06	05¾	05¾	100
Argonaut, Colo	22½	*24½	22½	22½	4,400
Aspen United, Colo	9	9	8½	8½	1,100
Bangkok, C. B., Colo	*13	13	12½	12½	2,000
Bates-Hunter, Colo	43	44	43	43	2,000
Big Indian, Colo	10	10	10	10	500
Big Six, Colo	9	*20½	9	9¾	1,000
Brownlow, Colo	13	13¾	13	13¼	100
Calliope, Colo	36	....	....	36½	.....
Cash	30	....	....	31	.....
Claudia J., Colo	08¾	09¾	08¾	09	1,600
Clay County, Colo	*13	*43	40	40	1,200
Diamond B., Colo	05¼	06	05¾	05¾	1,600
Emmons, Colo	20½	....	....	20	.....
Den. G. & Oil, Colo	28	*30	28	28	1,000
Golden Treasure, Colo	17	17½	17	17½	200
Hard Money, Colo	04½	....	....	04½	.....
Ironclad, Colo	23½	*26½	23½	24	2,100
John Jay, Colo	14	14	14	14	8:0
Justice	15	....	....	15	.....
Legal Tender, Colo	05	....	....	04½	.....
Little Rule, Colo	58	*62	58	59	6,000
Matchless, Colo	210	....	....	100	.....
May-Mazeppa, Colo	75	*79	75	75	3,800
Mollie Gibson, Colo	50	....	....	50	.....
Morning Glim, Colo	48	....	....	48	.....
Oro, Colo	300	....	....	500	.....
Park Consolidated	20¼	....	....	20	.....
Pay Rock, Colo	06¼	....	....	06½	.....
Potosi, Colo	15	15	15	15	100
Puzzler, Colo	16½	....	....	16¾	.....
Reed-National, Colo	70	71	70	71	400
Rialto, Colo	63	63	59	59	4,800
Running Lode	20	*23	20	20	100
Silver Cord, Colo	30	....	....	40	.....
Whale, Colo	29	30	29	30	300
Total for the week					35,300

*Buyer 30 days

St. Louis. July 16.

(From our Special Correspondent.)

Trading this week has been more brisk than it has been for some time, though it was confined almost exclusively to one or two stocks. American & Nettie, Central Silver, Elizabeth, La Union and I. X. L., all sold well during the week.

At a meeting of the board of directors it was decided to drop all stocks whose listing dues were unpaid. With this decision twenty-three stocks will disappear from the call, namely, Arizona, Black Oak, Bremen, Dinero, Eclipse, Golden Era, Gold Run, Iron Clad, Jumbo, Keystone, Little Giant, Mary Murphy, Mountain Lion, Neath, Pedro, Phillips, Pine Grove, Old Jesuit, Queen of the West, Raspberry, Silver Belle, San Francisco. As most of these companies were practically dead and were rarely traded in, it is more a benefit than otherwise to the Exchange. There are now thirty-six stocks remainining on call.

Mr. E. R. Stettinious has resigned as secretary of the Exchange. As yet, though the resignation has been accepted, no move has been made toward electing a successor.

Twenty-four bars, containing 34,100 ounces of silver and 77 of gold, constitute the regular semi-weekly shipment of the Granite Mountain.

The Bi-metallic, with a shipment of 26,615 ounces of silver and 24 of gold, breaks its record by 27 ounces of silver and five of gold.

Foxhall is a recently listed stock. It was offered at $2.25, with $2.00 bid.

Tourtelotte had a sale this week, the first for a month; 500 shares changed hands at 2½c., but the market was weak.

The stockholders of the Central Silver met Thursday and decided to add twenty stamps to their mill. The sum needed, $15,000, was subscribed at once by the stockholders present, who took the company's bonds as security. President Peck has just returned from the mine, which he reports as in a very favorable condition.

After a rest of several weeks Hope had a sale of 100 shares at 2c.

On July 10th the Granite Mountain declared dividend No. 67 of 50c. per share.

The Bi-Metallic declared dividend No. 1 on July 10th; it aggregated $50,000 at 25c. per share.

A $20,000 dividend at 4c. per share was declared by the Cœur d'Alene.

The Small Hopes company has just issued its annual report. It states an expenditure of $121,086.64 and receipts of $130,390.28, leaving a profit of $9,303.64.

Prices and sales for the week ending July 15th, are:

Company.	Opening.	H.	L.	Closing.	Sales.
Adams, Colo	$97½	$1.05	.97½	1.00	$800
American & Nettie	1.82½	1.95	1.82½	1.95	2,650
Buckskin	.08	.09½	.05½	.05½	100
Central Silver	.16¼	....	....	.14	23,000
Cleveland, Colo	.03	....	....	.03½	500
Cleveland, Idaho	.16¼	.17½	.15	.15	.....
Elizabeth	2 00	....	....	2.12½	3,900
Foxhall	2.00	....	....	2.00	.....
Granite Mountain	44.00	....	....	46.25	10
I. X. L.	.02	....	....	.01½	2,000
Ingram	.10	....	....	.30	.....
Ivanhoe	.07½	....	....	.08	.....
La Union	.11	.11½	.09½	.09½	12,500
Little Albert	.30	.35	.28¾	.33¾	200
Mickey Breen	1.25	1.30	1.22½	1.27½	.....
Major Budd	.07	....	....	.06½	.....
Mex. Imp	.07	.37½	.07	.10	.....
Mountain Key	.25	.30	.25	.25	.....
Montrose	.23¾	.42½	.23¾	.40	.....
Pat Murphy	.12½	.14	.12	.13½	1,100
Richmond	.09	....	....	.10	500
Small Hopes	.90	.92½	.85	.87½	.....
Silver Age	1.55	1.55	1.50	1.52½	100
Tourtelotte	.02	.02½	.02	.02	500
West Granite	1.00	....	....	1.05	.....
Wire Patch	.15	.16¼	.15	.15	.....
Yuma	.50	....	....	.42½	200
Total					47,860

Kansas City. July 15.

Company.	Opening.	H.	L.	Closing.	Sales.
Argonaut	22	22½	22	22½	1,800
Bates-Hunter	42½	43	42	43	10,500
Big Six	9½†	10†	9½†	10†	.....
Brownlow	20†	32†	20†	32†	.....
Cash Gold	33½	37	36½	37	900
Clay County	40½†	42*	40½†	42*	200
Diamond B	6	6½†	6	6½†	300
Hard Money	3†	..	..	..	.....
Hunki Dori	15	15½	15	15	4,300
Iron Clad	22†	..	..	..	.....
King Jack	5†	75‡	5†	75‡	.....
Little Nugget	59	59	58	58	1,200
Little Rule	57	60½	57	60	9,400
May Mazeppa	75	75	75	75	3,800
Minnequa Zinc M. Co	33*	33*	31	31½	5,500
Monte Cristo	12	13½	10	11½	22,200
Morning Glim	48	50	48	49	2,800
Pay Rock	8½†	9	8½	8¾	600
Pelican	20½	20½	20½	20½	800
Potosi	12†	..	..	..	.....
Running Lode	18†	18½†	18†	18½†	.....
Sylph	18½	19†	18½	19†	1,600
Total					65,900
Pit sales					1,000

Bid. ‡ Asked. * Buyer 30. § Seller 30. $* Seller 60. ‖ Buyer 60.

Minneapolis. July 15.

Company.	Bid.	Asked.
Algoma	.30	$1.00
Aurora I. M. Co	8.00	....
Badger Silver Mg. Co	9.00	*10.00
Bessemer Consol. I. Co	.15	....
Big Ox Mg. & Rec. Co	....	....
Black Hills Tin M. Co	....	1.50
Canada G. Mg. Co	....	.50
Carbonate Hill Mg. Co	.35	1.00
Clingstone I. Mg. Co	....	4.00
Crescent I. Mg. Co	.80	1.00
Deer Lodge Mg. & Sm. Co	....	....
Derwood Con. Mg. & M. Co	....	....
Dot Iron Mg. Co	....	1.50
El Dorado I. Mg. Co	....	1.00
Fairview S. Mg. Co	.35	.50
Glengary S. Mg. Co., Mont	....	....
Gogebic Iron Co	2.00	3.50
Iron Duke Mg. Co	1.00	1.50
Kakabeka Mg. Co	.25	1.00
Keystone Mg. Co	.20	1.00
La Belle I. Mg. Co	1.00	1.50
Marquette Iron Synd	....	3.50
North Pabst I. Mg. Co	....	....
N. W. Coal Mg. Co	3.25	3.75
Thunder Bay G. & S. M. Co	.70	1.00
White Spar Mica Mg. Co	1.80	2.00

* Actual sales.

Salt Lake City. July 12.

Company.	Opening.	Highest.	Lowest.	Closing.	Sales.
Alice, Mont.	2.40 b	2.60 b	2.40 b	2.60 b	.....
Anchor, Utah.	*4.20 b	4.50 a	*4.20 b	*4.20 b	.....
Alliance, Utah.	1.80 b	2.20 a	1.80 b	1.90 b	.....
Apex, Utah.	.19 b	.19¼ b	.19 b	.19½ b	12,400
Barnes, Utah	.14 b	.15½ b	.14 b	.15¼ b	14,100
Crescent, Utah.	.34 b	.35 b	.34 b	.35 b	1,500
Cent.-Eureka, Ut.	18.00 b	20.00 a	18.00 b	19.00 b	.....
Daly, Utah.	21.75 b	22.25 a	22.75 b	21.85 b	.....
Glencoe, Utah.	1.25 b	1.40 b	1.25 b	1.40 b	500
Horn Silver, Utah	3.10 b	3.50 a	3.10 b	3.10 b	.....
King of West, Id.	1.00 a	1.00 a	.80 a	.80 a	.....
Mammoth, Utah.	4.30 b	4.45 a	4.30 b	4.35 b	.....
Malad Con., Id.	.08 b	.08½ b	.07½ b	.08¼ b	11,300
Northern Spy	.....	.....	.....	.....	.....
Ontario, Utah.	43.50 b	43.50 b	43.50 b	43.50 b	.....
Utah L. & C. Co.	7.50 b	8.50 b	7.50 b	8.50 b	500
Utah Oil Co., Utah	.50 b	*.35 b	.25 b	.3 ½ b	22,500
Woodside, Utah.	.50 b	.50 b	.50 b	.50 b	.....
Total					62,800

* Buyer, 30 days. † Seller, 30 daps. a Asked. b Bid.

Lake Superior Iron and Gold Stocks.

(Special Report by David M. Ford, Houghton, Mich.)

IRON MINING STOCKS.

Name of company.	Par value.	Bid.	Asked.
Ashland Iron Co.	$25.00	$55.00	$58.00
Aurora Iron Co.	25 00	8.00	8.50
Champion Iron Co.	25 00	85.00	90.00
Chandler Iron Co.	25.00	38.00	40.00
Chapin Iron Mining Co.	25.00	30.00	33.00
Chicago & Minn. Ore Co.	100.00	115.00	118 00
Cleveland Iron Co.	25.00	18.00	18.50
Germania	25.00	11.50	12.00
Jackson Iron Co.	25 00	110.00	.....
Lake Superior Iron Co.	25 00	70,00	75.00
Milwaukee Iron Co.	25.00	5.50	6.50
Minnesota Iron Co.	100.00	84.00	86.00
Montreal Iron Co.	25.00	8.00	9.00
Norrie (Metropolitan)	25.00	65.00	68.00
Odanah Iron Co	25.00	20.00	22.06
Pittsburg Lake Angeline Co.	25.00	175.00	180.00
Republic Iron Co.	25.00	42.50	43.50

GOLD MINING STOCKS.

Name of Company.	Par value.	Lowest.	High.
Gold Lake Mg. Co.	.....	.....	.....
Grayling Gold & Silver Co.	$25.00	.....	.....
Michigan Gold Co.	25.00	$1.25	1.50
Peninsula Gold & Silver Co.	25.00	.50	.....
Ropes Gold & Silver Co.	25.00	2.25	2.30

* Actual sales were made at these prices.

PIPE LINE CERTIFICATES.

[Specially reported by Messrs. Watson & Gibson.]

The oil market continues on the even tenor of its way, and while prices have ruled fairly steady, the transactions have been of an exceedingly limited character. About the only feature that has presented itself in connection with this market during the past week is a rumor to the effect that a new issue of oil certificates based upon the Lima production is likely soon to be issued, and the various exchanges of the country will have an opportunity to deal in them. Lima, Ohio, is the great oil center for the Western oil fields, and as is known, this section is rapidly developing in the extent of producing territory. The stock of oil on hand there has been gradually increasing. It is on this stock that the proposed issue of certificates will be based, and many brokers and traders are of the belief that with this new issue of certificates will come a large and increasing speculation in the oil market.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 12.	88¾	89	88¾	89	37,000
14.	89	89	88½	88¾	60,000
15.	88⅝	88⅞	88⅝	88¾	43,000
16.	88½	88¾	88	88¼	31,000
17.	89¼	88¼	88⅜	88½	36,000
18.	89½	90¼	89½	89½	38,000
Total sales in barrels.					245,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
July 12.	89¼	89⅝	88⅝	88⅝	68,000
14.	89	89¾	88⅞	89	52,000
15.	88⅞	89	88⅞	88⅝	26,000
16.	89	89⅛	88⅛	88¾	23,000
17.	89	89	88⅜	88⅝	16,000
18.	89½	90	89⅜	89⅝	112,000
Total sales in barrels.					297,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, July 18.

Statistics.

Mr. John H. Jones, chief of the Bureau of Anthracite Coal Statistics, furnishes us the following statement of shipments of anthracite coal (approximated) for the week ending July 12th, 1890, compared with the same period last year:

Regions.	July 12, 1890.	July 13, 1889.	Difference.	
Wyoming Region. Tons	401,201	459,775	Dec.	58,574
Lehigh Region "	124,820	129,604	Dec.	4,784
Schuylkill Region "	227,892	226,016	Inc.	1,876
Total	753,913	815,395	Dec.	61,482
Total for year to date	16,580,061	16,590,577	Dec.	10,516

STATEMENT OF ANTHRACITE COAL SHIPMENTS for month of June, 1890, compared with the same period last year. Compiled from returns furnished by the mine operators.

	June, 1890.	June, 1889.	Difference.	
Wyoming Region. Tons	1,808,708	1,693,892	Inc.	114,816
Lehigh Region "	571,199	551,756	Inc.	19,443
Schuylkill Region "	1,065,654	787,567	Inc.	278,086
Total	3,445,561	3,033,215	Inc.	412,345
	For year, 1890.	For Year 1889.	Difference.	
Wyoming Region. Tons	7,855,732	8,051,704	Dec.	195,972
Lehigh Region "	2,930,615	2,841,384	Inc.	89,230
Schuylkill Region. "	4,579,605	4,254,112	Inc.	325,493
Total	15,365,952	15,147,200	Inc.	218,751

The stock of coal on hand at tide-water shipping points, June 30th, 1890, was 745,801 tons; on May 31st, 1890, 719,939 tons; increase, 25,862 tons.

PRODUCTION OF BITUMINOUS COAL for week ending July 12th and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1890. Week.	1890. Year.	1889. Year.
Phila. & Erie R.R.	2,840	69,960	34,846
Cumberland, Md.	*71,293	1,918,833	1,507,110
Barclay, Pa.	*3,642	77,342	59,503
Broad Top, Pa.	7,591	271,834	161,334
Clearfield, Py.	71,085	2,048,042	1,542,204
Allegheny, Pa.	22,640	703,822	411,765
Beach Creek, Pa.	38,642	986,965	640,712
Pocahontas Flat Top.	30,801	1,003,444	803,621
Kanawha, W. Va.	†27,767	1,086,070	808,152
Total	276,301	8,166,312	6,029,247

* Estimated.
† For week ending July 7.

WESTERN SHIPMENTS.

Pittsburgh, Pa.	15,911	465,653	304,194
Westmoreland, Pa.	9,725	731,616	714,992
Monongahela, Pa.	13,699	229,992	162,545
Total	39,335	1,427,261	1,181,731
Grand Total	315,636	9,593,573	7,210,978

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending July 12th, and year from January 1st, in tons of 2,000 lbs.: Week, 97,129 tons; year, 2,857,694 tons; to corresponding date in 1889, 2,332,107.

Anthracite.

The sales agents have concluded that too much anthracite coal is being mined for the time of year, and at a special meeting held on Thursday, they concluded to cut down the July output from 3,250,000 tons to 3,000,000 tons. There has been a general complaint all over the trade since the July prices and output were agreed upon, and even the concession of 250,000 tons as received with the assertion that it will make little difference in the end unless those concerned stop producing more than their due proportion. If the same proportion of over-production of the past few months be maintained as it is, nearly 3,500,000 tons will be mined in July, and with the dullest month, August, to face yet. There is no expectation that the prices will be increased for next month, and, in fact, no perceptible business has yet been done at July prices.

It is the opinion of those well versed in the trade that the year will see a total output of 37,000,000 or 38,000,000 tons, and it is to be hoped, if this view is correct, that the 250,000 now cut off the July output will not be added to the production later on, or it may affect the tone of the market adversely. Stocks of coal are generally very large, and they are still accumulating, so that it is expected some one will have to suffer before fall trade sets in. It is not infrequently suggested in the trade that it might be wise to give the mines a two weeks' vacation during the heated term. If this were done it is pretty certain the brisk season would be hastened, prices would be better lived up to, and the market between now and September would be stronger.

As it is it is not weak, but so little is doing that it cannot be called firm, while the stocks continue to increase.

The companies' list prices f.o.b., for July, remain: New York harbor for free-burning coals: Stove, $4; egg, $3.75; broken and chestnut, $3.65; pea, clear free-burning, $2.50 f. o. b.; other grades, 10 cents to 30 cents less; buckwheat, $1.60 to $1.80 f. o. b.

Bituminous.

Cars and boats are more abundant this week than last, and as a consequence the slight stringency in the supply has been overcome. But while soft coal is coming in more freely, the market is very dull, and nothing is doing beyond filling contracts. Stocks generally are in good condition, but it is reported that the operators of some of the mines where labor troubles are looked upon as possibilities a little later on are stocking up largely in anticipation. One concern is reported as having a large number of boats full in these waters with that contingency in view, and is said to be paying $3 a day each for the boats.

Labor matters continue much as they were. The Reynoldsville and Westmoreland men are said to be still out, with no immediate prospect of a peaceful settlement. The season helps the operators, and though local trouble later on is looked upon as among the possibilities here and there, no general trouble is anticipated.

Freights from Boston and Philadelphia are about 5 cents lower, with plenty of facilities to be had.

Prices remain: Baltimore, $2.40@$2.50 f. o. b.; Philadelphia, $2.50@$2.60; in New York harbor, $3.25; alongside, $3.50.

Boston. July 17.

(From our Special Correspondent.)

The anthracite coal market remains in a very quiet condition. Retailers see no signs of any advance and are not inclined to anticipate their wants. The signs point to a decline, if in any direction. It is not considered probable that the companies will make any reduction in announced prices, but that there will be an easier market if production be not more effectively curtailed. Many retailers did not pay over $3.55@$3.60 for broken coal, and they would like to be able to take on more at that figure. Good stove coal can be had at $3.65@$3.70 f. o. b. at New York now, or at about the price of broken and egg sizes. The fact that the local retail trade here in Boston is no longer governed by a combination makes every one anxious to put on coal at the lowest possible figure, for there may come a period of cutting and slashing of prices when every cent on the first cost will count. Jobbers on their part are disposed to take less risks in the way of credit to the small dealers than for a year or two past when every one here has been making a fair thing in the retail coal trade.

Receipts have been large, and there is some coal afloat but none pressing for sale to the extent of seriously affecting the market. We are now approaching the time of year, or rather of the coal season, when retailers do not care especially to see prices go off, as it tends to retard trade from consumers; but, as above explained, this feeling is tempered somewhat this year by the unsettled state of the local trade in Boston. Outside of Boston there is no especial feature in the retail trade. Cutting of prices is reported in one or two places, but there is no more of it than usual in the region tributary to this market.

The bituminous market is notable only for large receipts. Prices are unchanged at $2.25@$2.40 f. o. b. Jobbers are holding well up to the maximum prices of the season, or at least to the maximum prices obtained since the reduction of tolls. Coal is coming from all soft-coal producers very well at present. General freight traffic is not so rushing as at some times, and wise shippers are getting as much coal forward as possible.

The freight situation is not materially changed, vessels are fairly abundant, and at New York range from 65 to 75 cents, the latter figure being paid for small, light draft vessels only. At Philadelphia the range is 90c.@$1, and at Baltimore $1.10@$1.15, but with few charters below $1.15.

The retail movement is still rather light. Dealers are delivering 2,000 pounds stove coal at $5.25, which does not allow them any large margin even on their low-priced coal bought early in the season. Trade is expected to improve a little during the rest of the month.

Buffalo. July 17.

[From Our Special Correspondent.]

Excessive heat, moderated somewhat at our port by delightful lake breezes, has not been conducive to activity among dealers in coal during the past seven days. There are no incidents worth recording, and no changes in prices, demand or supply to chronicle.

The Lake Carriers' Association met here Tuesday and passed resolutions in opposition to the three bills now before Congress, providing "That the government piers of Buffalo, Chicago and Fairport shall be given over to the free and exclusive use of certain firms for purposes of private gain." This action, as regards Buffalo, means opposition to the coal docks, trestles, etc., of the Delaware, Lackawanna & Western Railroad Company.

During the year ending June 30th, 1890, no less than 10,108 vessels passed the Sault Ste. Marie Canal locks; included in the freight were, 1,984,433 net tons of coal.

Lake freight steady at unchanged figures; moderate business only. The shipments of coal from this port from July 10th to 16th, both days inclusive, agregate 41,700 net tons, namelv, 13,400 to Chicago, 11,480 to Milwaukee, 2,600 to Duluth, 3,190 to Toledp, 4,300 to Superior, 500 to Detroit, 1,000 to Saginaw, 230 to Bay City, 1,000 to Gladstone, 2,350 to Marquette, 1,450 to Port Huron and 200 to Wallaceburg; total thus far this season 713,810 net tons. The rates of freight were 60c. to Chicago, 75c. to Wallaceburg, 50c. to Milwaukee and Portage, 40c. to Duluth, Superior, Saginaw, Port Huron, Marquette, Bay City and Gladstone and 30c. to Detroit and Toledo.

Coal receipts by canal, second week in July, 752 net tons; shipments, 127 net tons.

From the report of the business of the Sault Ste. Marie Canal for the year ending June 30, 1890, it appears that there passed the locks 30,087 net tons of copper ore, 4,404,935 net tons of iron ore, 5,905 net tons silver ore, and 72,163 net tons of pig and manufactured iron. The total freight tonnage of all merchandise was 8,288,580.

Chicago. July 16.

In this market trade appears—although dull now—to be assuming satisfactory conditions under the recent advance in prices and with no local difficulties as to transportation in the way. A fair business continues, both for bituminous and anthracite, and there is absolutely no change worthy of note.

We continue to quote retail prices large egg $5.75, small egg, range and chestnut, $6.

On cars, f. o. b., Chicago grate $5, stove, range and chestnut $5.25.

The figures for bituminous remain firm and unchanged also.

They are, per ton of 2,000 pounds: Green and Sullivan County (Ind.), shaft, $2.25@$2.40; Jackson Hill, $3.25; Hocking Valley, $3; Ohio Central, $3; Erie, Briar Hill, $4.15@$4.20; Indiana Block, $2.35; Youghiogheny, $3.35; Sunday Creek, $3; Connellsville, $5.20.

Pittsburg. July 17.

[From our Special Correspondent.]

Coal.—The situation is about the same; the season, so far as river is concerned, has passed into history. The coal shipments by the Ohio river from January to June 30th foot up as follows: Cincinnati, 19,948,000; Louisville, 36,285,000; total, 56,233,000 bushels. There is no change in the railroad situation.

Nominal rates in pools:

Per 100 bushels.		Per 100 bushels
1st pool.....$4.75	3d pool.....	$3.90
2d pool..... 4.50	4th pool	3.25

Railroad coal, $5.00@$5.50.

Connellsville Coke.—The demand has fallen off nothing more than the summer dullness that generally comes along about this time; the general opinion is that this year this will be of short duration, as most of the furnaces being repaired will soon be in blast. Generally the coke works will make five day runs; some will operate in full. Week's shipments, 5,900 cars; Eastern shipments fell off, and Western shipments fully 200 cars; Pittsburg shipments increased 300 cars. There are about 4,000 idle ovens.

Prices remain firm at the following figures, per 2,000 pounds f.o.b. cars at ovens:

Blast furnace coke, $2.15; foundry coke, $2.45; crushed coke, $2.65.

Freights to Pittsburg, 70c. per ton; Mahoning and Shenango Valleys, $1.35; St. Louis, $3.30; Cleveland, $1.70; Chicago, $2.75.

FREIGHTS.

From Baltimore to: Bangor, 1.10; Bath, 1.10; Boston, Mass., 1.10; Charleston, .75; Fall River, 1.10; Galveston, 3.40; New Bedford, 1.10; New Haven, 1.10; New London, 1.10; New York, N. Y., 1.05; Portland, 1.10; Portsmouth, N. H., 1.10@1.15; Providence, 1.10; Richmond, .70; Salem, Mass., 1.10; Savannah, .80@.85; Somerset, 1.10; Williamsburg, N. Y., 1.05.

*And discharging. †Alongside. ‡And towage. §Flat

METAL MARKET.

NEW YORK, Friday Evening, July 18th.

Prices of silver per ounce troy.

July	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.	July	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
12	4.88	48⅝	1.07	16	4.87½	50 5 16	1.09¾
14	4.88	49¼	1.08	17	4.87	50	†
15	4.88	50	*	18	4.87¼	49¾	‡

* 1.09⅛ to 1.09¼. † 1.09¼ to 1.09. ‡ 1.08⅞ to 1.08½.

After the prompt signing of the Silver Bill by the President, the price of silver rapidly advanced in the London market, touching 50⅛d. on Thursday, 16th, at which figure some large sales were made in London, checking demand and causing a reaction. The large stock of silver held in New York on deposit, together with usual supply coming forward for sale, will probably prevent any sharp advance until the new bill has taken effect and the government has absorbed some of the surplus stock on hand.

Silver Bullion Certificates.

NEW YORK STOCK EXCHANGE.

	Price. H.	Price. L.	Sales.
July 12	108	107⅝	43,000
July 14	109¼	108¼	425,000
July 15	109⅜	109¼	289,000
July 16	110⅛	109⅜	495,000
July 17	110	109⅜	91,000
July 18	109½	108¼	435,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

July 12	108	107¾	30,000
July 14	109⅛	108¾	50.000
July 15	109½	109⅜	40,000
July 16	110	109⅝	40,000
July 17	109⅝		10,000
July 18	109⅛	109⅛	70,000
Total sales			2,018,000

Foreign Bank Statements.

The governors of the Bank of England at their weekly meeting on Thursday made no change in its rate for discount, and it remains at 4 per cent. During the week the bank lost £302,000 bullion and the proportion of its reserve to its liabilities was raised from 34·81 to 34·87 per cent., against a decline from 39·05 to 38·03 per cent. in the same week of last year, when its rate for discount was 2½ per cent. On the 17th inst. the bank lost £45,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 400,000 francs gold and a loss of 4,025,000 francs silver.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked
Trade dollars	$ .81	$ 83
Mexican dollars	.84	.85½
Peruvian soles and Chilian pesos	.75½	.76½
English silver	4.86	4.90
Five francs	.94	.95
Victoria sovereigns	4.90	4.93
Twenty francs	3.86	3.90
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.80	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00
Bar silver	1.08¼	1.09¾

Copper.—Our market remains exceedingly firm, and some transactions in Lake copper for July and August delivery are reported at 17 cts. Some of the large producers are sold out for these months, and have refused that price for later delivery. Some second-hand parcels of Lake ingot might still be secured at from 16¾ to 16⅞ cts., but there is no pressure to sell, and from the heavy deliveries which continue it is evident that consumption is as large as ever.

Arizona is somewhat firmer at 15½ cts., but casting copper is still to be had at 14⅞ to 15 cts.

Rather in contrast with this is the course of the London market, which has shown a drooping tendency throughout the week, the closing prices for G. B. M.'s being £57@£57 5s. spot, £57 17s. 6d.@£58 three months. Early in the week it was reported that the French bankers had sold their entire holdings of copper in Europe to English buyers, and in view of this transaction it is somewhat astonishing that the price should have given way unless this is due to market manipulations.

The statistics for the first fortnight of this month show an increase of 800 tons, but we understand that deliveries are going on quite briskly on the other side, and that manufacturers are fairly busy. Following are the closing quotations: English tough, £61 10s.; best selected, £63 10s.; strong sheets, £70; India sheets, £65; yellow metal, 6¼d.

The exports of copper during the past week were as follows:

To Liverpool—	Copper.	Lbs.	
S. S. Majestic	67 cases.	125,207	$15,000
To Havre—	Copper.	Lbs.	
S. S. La Bretagne	359 bars.	112,052	12,322
To Hamburg—	Copper bullion.	Lbs.	
S. S. Rhaetia	16 bars.	998	3,100
To Rotterdam—	Copper.	Lbs.	
S. S. Sparndam	13 casks.	16,250	2,600

Tin.—The passing of the Silver Bill and its immediate signing by the President, at the beginning of the week did not fail to stimulate this metal, and the London prices became much higher and a good business was reported at gradually hardening prices, the highest point reached being on the 16th inst.: £96 spot, £96 5s. futures. After this a slight reaction set in with very light transactions, the market closing at £95 2s. 6d. spot £95 15s. three months.

The action of our market was even more marked. Large transactions took place the first half of the week for spot July and August deliveries, and $21.50 for July and $21.35 for August were realized; but with lower quotations from London these prices could not be sustained, and the market closed steady but dull at $21.40 spot, $21.40 July, $21.30 August, $21.25 September, but at the lower quotations more buying is noticeable.

Lead has been ruling rather quiet and only a few sales are to be reported at 4·50c. spot. Consumers have not entered the market to any great degree, and there is no pressure to sell.

The Chicago Lead Market.—Messrs. Everett & Post telegraph us as follows: "The market has ruled quiet during the week, with but little change in values. Sales foot up about 300 tons at 4·40@4·45c. At the close the market is steady, with 4·45c. being asked for chemical, and 4·50c. for desilverized."

The St. Louis Lead Market.—Messrs. John Wahl & Co. telegraph us as follows: "The lead market opened and closed at about the same figures. Prices have been firm at 4·35 to 4·37½c. For some special brands as high as 4·40c. delivered at East St. Louis has been paid for future delivery."

Spelter remains in good demand with very light offerings. We quote 5·50@6·60c. In London good ordinaries are quoted at £23, and specials at £23 7s. 6d.

Antimony continues firm at prices quoted last. Cookson's 24½@25, Hallett's 21@22.

Nickel remains scarce and firm at 80@85c.

Quicksilver.—New York quotations for this metal are $55. The London price continues to be £10 10s. There is a steady, consumptive demand going on, but nothing of any particular importance has occurred during the week.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, July 18.

The dullness in the iron market continues, for which no doubt the extreme heat of the present week is in part at least directly accountable, and those concerned have little to occupy themselves with but hope of a good fall and winter trade. Transactions are few and small, the rumors of large deals dwindling to nothing on investigation.

It is generally admitted that, though prices average nearly a dollar a ton all round higher than at the corresponding week of last year, business could not possibly be slower. Little of any thing is offered, as the output is restricted, which maintains the firm tone of the past few weeks.

American Pig Iron.—The market for pig iron may be said to be dull and firm, with no sales worth mentioning. Gray forge is said to be a little weaker at $15, but as little is done in this iron in this market, it scarcely amounts to anything worth recording. Prices quoted are not by any means uniform, which indicates the absence of any volume of business and accentuates the statement that prices quoted are more nominal than real. Southern, No. 1, $17.50@$18, and No. 2, $16.50@$17. Northern brands sell for $18@$18.50 for No. 1 and $17@$17.50 for No. 2.

Scotch Pig Iron.—Dealings in Scoth pig are completely at a standstill, and although the market is quoted as firm, there is such an absence of buyers that the prices given must be taken as what is asked rather than what would be taken if any business offered: No. 1 Coltness, $23.50; Dalmellington, $20.50; Eglinton, $19.75.

Spiegeleisen and Ferromanganese—Nothing beyond the smallest transactions are claimed by any one concerned in this market. Prices remain firm, though in some quareers ferromanganese is quoted several dollars a ton lower than our prices, but no one could be found willing to sell at less than the quotations we give. Twenty-per cent. spiegeleisen remains at $30.50@$31 and 80 per cent. ferro at $77@$78, which is considerably higher than the prices prevailing in July 1889.

Steel Rails.—Nothing doing; orders talked of; round numbers used freely concerning contracts which, on investigation, turn out to be transactions in some other markets. Prices remain firm at $31.50@$31.75, but at the lower price probably any reasonable quantity could be secured. It is said that there is an order in the market for 7,500 tons for a "Southern road, Savannah delivery," with an option of 2,000 tons more.

Rail Fastenings.—Business is almost at a standstill. Prices are unchanged: Spikes, 2c.; angle plates, 1·85@1·90c.; bolts and square nuts, 2·70c., and hex. nuts, 2·95c.; complete joint, steel and iron, according to weight.

Structural Iron and Steel.—Business in this branch continues good, owing mainly to the extensive building going on everywhere. Universal plates have advanced $2 a ton, and it is expected that a similar rise will follow in other structural irons and steel. We have information that one large concern has notified several of its customers that unless contracts based on former prices are closed within a week, the estimates made will be withdrawn. Prices are now: Universal plates, 2·20@2·28c.; bridge plates, 2·15@2·20c.; angles, 2·10@2·15c.; tees, 2.65c.; beams, 3·10c. With the exception of universal plates, these are last week's prices. While they have not changed, the evident upward tendency is stiffening them all round.

Tubes and Pipes.—Business is not very brisk, without any very perceptible falling off, but there is an absence of strength which is sympathetic with the iron trade generally at this season. The fact that the 2,600 men in the mill of the National Tube Works at McKeesport are on strike has no visible effect on the output, as the company, which is filling several large contracts, has sufficient capacity at its command at other mills. There is no question of prices in the strike. It is one of recognition of the Union, and the employés state their firm determination not to surrender any further on the question. The prices are: For tool steel, $7.75@$8; specials, $12@$25; open hearth machinery, $2.75; Bessemer machinery, $2.50@$2.60; open hearth spring, $2.60@$2.65; tire, $2.50@$2.60; toe calk, $2.70@$2.80; crucible sheet, $7@$10; crucible spring, $3.75.

Merchant Steel.—Business is slack, and the prices quoted are nominal till stocktaking is concluded and the factories resume with cooler weather: Best English tool steel, 15c. net; American tool steel, 7½@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3¾c.; open-hearth machinery, 2¾c.; open-hearth spring, 2¾c.; tire steel, 2¾c.; toe calks, 2¾c.; flat file, 4¾c.; mill file, 5¼c.; taper file, 7¼c.; first quality sheet, 10c.; second quality sheet, 8c.

Old Rails.—No reliable trace of any considerable transactions in this market could be found, sellers of "expectation" stock ask $25 a ton; buyers offer $24@$24.50, but can find no old rail material at those figures and little even at higher ones.

Chicago. July 16

The first half of the present year shows a marked increase in the iron industry in the Chicago market. The consumption of structural iron and steel has been enormous; mills are taxed to their

utmost. From pig iron to the finished material the general condition of all the allied trades continues to improve in all directions. The past week has shown a considerable improvement upon the usual midsummer July buyings. Lake Superior charcoal irons remain stationary as to prices, and furnaces turning out these brands are very firm as to figures; this being the season of lake navigation, heavy shipments are going forward to fill contracts already made. Southern irons remain about the same. The price is firm, and no disposition to make concessions is shown in any way.

Pig Iron.—Numerous transactions in charcoal and coke Lake Superior irons are reported closed during the past week, cokes perhaps leading, and this market is very materially strengthened. A number of Southern furnaces have marked up their product 25 cents per ton, which, with the firm front presented by others, almost rules Alabama pig out of this market.

We quote to-day for cash per ton of 2,240 lbs. f. o. b. Chicago: for Nos. 1 and 2, Lake Superior charcoal, No. 3, for car wheels, Nos. 4 and 5, for malleable, $20.50@$21; Lake Superior coke Bessemer, $18; Lake Superior coke Bay View No. 1, $17; No. 2, $16; No. 3, $16. Southern coke No. 1, $16.50@$17; No. 2, $15.50@$16; No. 3, $15@15.50.

Southern charcoal, $19@$19.50; standard Southern car wheel, $24@$25; Ohio softeners, Hanging Rock, $18.50@$19; Jackson County, $18@$19; Hanging Rock cold blast, $26@$28; warm blast, $23@$25; No. 1 Scotch, according to brands, $25@$26; American Scotch, $19@$20; Bay View Scotch No. 1, $17; No. 2, $16; Chicago Scotch No. 1, $17; No. 2, $16; Emma Scotch, $19@$19.50; Black band, Hubbard Scotch, $19.50; Haselton, $20.25; soft Silvery, $18; Wellston No. 1, $19; No. 2, $18.50@$19; Hamilton No. 1, $18; Norton No. 1, $18@$18.50; Zanesville No. 1, $18.

Bar Iron.—Mills are shut down for repairs and this market shows no falling off in the demand, while inquiry is stronger than ever for future delivery and prices are very firm; this market is reported to be in sellers' hands. Regular quotations are $1.80@$1.85, half extras, f. o. b. Chicago, and specifications must be gilt edged to secure inside figures. Dealers quote $1.95@$2, with a moderate demand only.

Black Sheet Iron.—The prospects are good for a fair amount of business in this direction as soon as the mills resume operations. At present trade is a little slow, and dealers are charged with cutting prices for immediate delivery. Quotations are $3@$3.10 f. o. b. mill for No. 27: Store prices are $3.40@$3.50 for No. 27, $3.30@3.40 for Nos. 25 and 26 and $3.20@$3.30 for No. 24.

Galvanized Sheet Iron.—This market is without new phases; the demand continues large, and quotations are maintained with great firmness. In view of the general upward turn of the market manufacturers are avoiding making contracts for future delivery, prefering to take the chances later on. Discounts for both cheap and standard brands are now 62½ per cent. on Juniatta and 62½ and 5 per cent. on charcoal from store. Jobbing lots are quoted according to quantities.

Merchant Steel.—Some fair sized contracts have been placed this week by implement manufacturers for their season's requirements at an advance of about $4 per ton over figures of last year; present prices are: for tool steel, $7.75@$8; specials, $12@$25; open hearth machinery, $2.75; Bessemer machinery, $2.50@$2.60; open hearth spring, $2.60@$2.65; tire, $2.50@$2.60; toe calk, $2.70@$2.80; crucible sheet, $7@$10; crucible spring, $3.75.

Car lots are: tire steel, $2.20; toe calk, $2.40@$2.50; Bessemer bars, $2.25@$2.30; machinery, $2.60@$2.80 f. o. b. Chicago, 60 days.

Plates, Tubes, etc.—The expected advance has not as yet taken place, but former prices under the existing fair demand are still adhered to very firmly. Several large specifications are said to be on the market for plates, tank iron and steel, with an outlook never better than at present for a heavy trade during the late summer and fall months. We quote as follows: tank iron, $2.70; tank steel, $2.90; heavy sheets from 10 to 14, $2.50@$3; steel sheets 10 to 14, $3.25@$3.50; shell iron, $3@$3.25; flange iron, $4@$4.25; flange steel, $3.50; shell steel, $3.25; boiler rivets, $4@$4.25; fire box iron and steel, $4.75@$5.50; boiler tubes 4½ inches and larger 52½ per cent., 2 to 4 inches 50 per cent., and 1¼ inches and smaller 45 per cent.

Structural Iron.—The demand continues heavy, which if continued, the present rate of consumption will cause a shortage later on. The enquiry for bridge construction is also good; prices are as yet unchanged. We quote: angles, iron and steel, $2.30@$2.40; universal plates, $2.50; sheared plates, $2.50; tees $2.60@$2.70; beams and channels $3.20. Store prices are: angles $2.50@$2.60; tees $2.80; beams and channels $3.70.

Nails.—Steel cut nails are held at the $2 rates and wire nails at $2.50; in the latter slight concessions are made for quantities; the demand is somewhat lighter than that of a week ago; stores here are holding firmly to former figures, $2@$2.05; wire nails are also firm at stores at $2.40@$2.50 per keg. Some mills have started up again with many orders taken

Scrap Iron.—This market remains dull, and the demand for first class material, owing to the idleness of mills and furnaces, is limited. We quote: country mixed scrap, $13.50@$14, according to condition; No. 1 mill, $14@$14.50; light wrought, $9.50, horse shoes, $19.50@$20; axles, $23; cast machinery, $12.50@$13; stove plates, $9.50@$10; borings, $8.50@$8.75; wrought turnings, $11.50@$12; No. 1 railroad shop or forge, $19.50@$20; track scrap, $19.50.

Sheet and bolt copper 25c. pound rates. Sheet brass, copper and brass wire, 20 per cent. discount factory delivery.

Louisville. July 15.

(Special report by HALL BROS. & CO.)

A fair volume of business has been done in pig iron during the past week, but there are no trades of special interest to report. Locally, business has been somewhat disturbed by the railroad strike, though that has now been at least temporarily settled. Furnaces claim to be comfortably booked with orders and the trade well supplied, and from this view their positions seem about balanced, though there are rumors current of some concessions being made in both coke and charcoal irons to effect sales.

Hot Blast Foundry Irons.

Southern Coke No. 1	15.00@ 15.25
" " No. 2	14.25@ 14 50
" " No. 3	14.00@ 14.25
Mahoning Valley, Lake ore mixture	17.75@ 18.75
Southern Charcoal No. 1.	17.00@ 17.50
" " No. 2.	16.50@ 17.00
Missouri " No. 1.	18.00@ 18.50
" " No. 2	17.00@ 17.50

Forge Irons.

Neutral Coke	13.75@ 14.00
Cold Short	13.75@ 14.00
Mottled	12.75@ 13.25

Car Wheel and Malleable Irons.

Southern (standard brands)	22.00@ 23.00
" (other brands)	18.00@ 19.00
Lake Superior	22.50@ 23.00

Pittsburg. July 17.

(From our Special Correspondent.)

Raw Iron and Steel.—The market since our last has undergone but little change; we are now in the midst of the dullest portion of the year, caused by a combination of circumstances. Among the works shut down, taking stock and making annual repairs are the following: Wheeling Works, Bellaire Nail Works, and Laughlin & Co. Among the Pittsburg firms are Shoneberger & Co., Linden, Moreheads, Appollo, Anderson, Depuy & Co., Beaver Falls Mill.

In regard to values we have no change to note, holders being of the opinion that prices are fully as low as they ought to be. Furnacemen report an increased inquiry for Bessemer during the week. City furnace refused an offer of $18.75 for 2,000 tons at the furnace, $19 being the lowest they would accept. There has been an increased demand for foundry irons; sales liberal for the season. In the Mahoning and Shenango valleys a number of furnaces have closed down for repairs and stock taking. Until they start again sales will necessarily be for future delivery.

Reports are well authenticated that parties are now in the market to place contracts for a large amount of pipe, which will require between 35 and 40,000 tons of skelp iron to complete the contract; this, in connection with other matters now under consideration, gives the outlook for the second half of the year present a healthy appearance. The lull we have noted in trade is not regarded as indicating any impending break in the market, nor is it believed that any extensive weakness will be developed. The quietness that now prevails is likely to continue for a short time at least, but as the curtailment is in both production and consumption, there is nothing in this prospect to disturb the equilibrium of the market. The general condition of the trade is one of strength and stability; the occasional weak spots being due mainly to the emergency of holders of unusual stocks who desire to realize upon their holdings. There is no iron of consequence in the hands of speculators, nor is any of the weak furnaces carrying stocks of burdensome amount. The only stocks of consequence are in the hands of those who are fully able to take care of them and are not at all likely to break the market with their holdings. The furnace returns for the 1st of July show that there has been no change in the number of producing stocks, but the productive capacity of the furnaces now in blast is less by about 35,000 tons per week than it was a month ago.

Coal and Coke Smelted Lake Ore.

2,000 Tons Bessemer at Furnace	18.50 cash.
1,500 Tons Bessemer	19.00 cash.
1,000 Tons Grey Forge	15.50 cash.
1,000 Tons Bessemer	19.30 cash.
1,000 Tons No. 1 Mill	15.75 cash.
1,000 Tons No. 1 Foundry, all Ore, Val. Fur.	17.50 cash.
500 Tons Grey Forge	15.60 cash.
500 Tons No. 1 Mill City Furnace	16.00 cash.
500 Tons Bessemer	19.50 cash.
300 Tons No. 1 Foundry	17.50 cash.
300 Tons No. 2 Foundry, all Ore	17.30 cash.
300 Tons Close and Mottled	15.25 cash.
200 Tons No. 1 Foundry, Cinder Mixed	18.10 4 mo.
100 Tons No. 2 Foundry, Cinder Mixed	16.75 cash.

Coke Native Ore.

100 Tons No. 2 Foundry	16.50 cash.
75 Tons Silvery	17.50 cash.
75 Tons White Iron	14.50 cash.

Muck Bar.

2,000 Tons Neutral	29.00 cash.
1,500 Tons Neutral	29.50 cash.
1,200 Tons Neutral, September	29.50 cash.
500 Tons Neutral	29.25 cash.
500 Tons Neutral	29.00 cash.

Steel Billets and Slabs.

2,000 Tons Billets, August and September	31.50 cash.
1,000 Tons Billets	31.00 cash.
1,000 Tons Billets and Slabs	31.25 cash.
500 Tons Billets and Slabs	31.50 cash.

Skelp Iron.

1,000 Tons Sheared Iron	200 4 mo.
200 Tons Wide Grooved	185 4 mo.
160 Tons Narrow Grooved	175 4 mo.

Steel Wire Rods.

500 Tons American Fives, August	44.00 cash.
500 Tons American Fives	43.50 cash.

Ferro-Manganese.

85 Tons 80 per cent., Balt.	75.00 cash.

Bloom Ends.

1,000 Tons Bloom Ends	21.50 cash.
500 Tons Bloom Ends, Aug.	21.00 cash.

Steel Blooms.

750 Tons Large Blooms	31.00 cash.

Scrap Material.

200 Tons Crucible Steel, net	28.00 cash.
150 Tons Car Wheels, gross	18.00 cash.
150 Tons Cast Scrap, gross	15.50 cash.
150 Tons Iron Axles, net	27.00 cash.
100 Tons No. 1 W. Scrap, net	21.00 cash.
100 Tons Leaf Steel, net	23.00 cash.
100 Tons W. Turnings, net	15.00 cash.
100 Tons Cast Scrap, gross	15.50 4 mo.
100 Tons O. H. Steel, gross	17.50 cash.

Prices.

Coke or Bituminous Pig—		20% Spiegel at New York	$31.75@32.00
Foundry No. 1.	$17.50@17.75	Muck-Bar	29.00@29.50
Foundry No. 2.	16.25@16.50	Steel Blooms	31.00@31.50
Gray F. No. 3.	15.50@15.75	Steel Slabs	31.00
" No. 4.	15.00@15.25	Steel Cr'p Ends	21.00@21.50
White	14.50@14.75	Steel Bl. Ends	21.50
Mottled	14.50@14.75	Ferro-Man., 80% f.o.b. Baltimore, Sept.	75.00
Silvery	17.50@18.25	Steel Billets	31.00
Bessemer	19.00@19.50	Old Iron Rails	27.00@
Low Phos	24.00@24.50	Old Steel Rails	21.50@22.00
Charcoal Pig—		No. 1 W. Scrap	20.00@21.00
Foundry No. 1.	23.50@24.50	No. 2 W. Scrap	18.00@
Foundry No. 2.	22.00@2.75	Steel Rails	32.00@
Cold-Blast	25.00@29.00	" light sec.	32.00@36.00
Warm-Blast	24.00@25.00	Bar Iron, nom.	1.85@ 1 90
10 + 12% Spiegel f. o. b. N. Y.,	29.00	Iron Nails	1.90
		Steel Nails	1.90
		Wire Nails	2.25@ 2.30

Philadelphia. July 17.

(From our Special Correspondent.)

Pig Iron.—Brokers and company agents are doing a good deal of talking about the coming advance in pig iron, that buyers take very little stock in. Instead of consumers hurrying into market, they are demanding concessions from present quotations. The only sales of any magnitude are large lots of inferior iron, which are hard to move at any time. Special brands of iron have been inquired for, but makers have not any sales to report. No. 1 foundry has been unusually dull all week, and No. 2 is also neglected. The buyers of forge iron have not yet appeared in the market, and quotations continue at $15 to $15.50. A desirable iron cannot be had at less than $15.25. No. 1 foundry is quoted at $18 to $18.25; now and then a sale is reported at something under $18. For Bessemer, $19 has been offered.

Foreign Material.—Ferromanganese is quoted at $75 and spiegel at $31.50, but no business has been closed.

Muck Bars.—There are offers for muck bars at $28.50, delivered, but sellers are asking 50c. to $1 more.

Steel Billets and Slabs.—Buyers and sellers are doing nothing in the way of new business. Ordinary quotations, $32.50 to $33. One offer was received at $31.50 to-day, and the buyer thinks his offer will be accepted.

Merchant Iron.—Most of the mills are now running along, but there are still some concerns that have not yet signed the scale. The hot weather has caused a suspension in some forge departments. Good iron is selling at 1·80@1·85. Manufacturers think the market is in such a situation that prices could be advanced under a moderately active demand.

Sheet Iron.—The sheet iron people all say business is remarkably good and that there will be no different report during the remainder of the year. The galvanizing departments are very busy. Discounts, 60 to 67 per cent., according to quality.

Skelp Iron.—Grooved is 1·75c. and sheared 2c. Compared to two weeks ago, this is an advance.

Wrought Iron Pipe.—The mills are simply overcrowded, and there is nothing else to say.

Plate and Tank Iron.—Small buyers have found it necessary to pay an advance of a tenth for 30-day accommodations. The past week has brought out a good many small customers for both iron and steel plate.

Structural Iron.—Quite a number of builders and buyers of small lots of shaped iron have placed their orders since Monday, the result of which has been an advance of one-tenth on small buyers who want prompt accommodations. Some large buyers are negotiating this week for large supplies, and when these orders are placed it will enable the mill men to crowd prices up a little on small buyers. Sheared plate and angles are 2·25c. for iron. Two or three large buyers have secured options at considerably less than these figures.

Steel Rails.—A great deal of business comes to the rail mills, which is not allowed to reach the public ear. Quotations for large lots are said to be $32, but there are parties in the interests of

buyers who claim that large transactions have been closed at Pennsylvania mills at fully a dollar less. Mills are all sold up for the summer, and there is a large amount of fall business looming up.

Old Rails.—Old rails are quoted at and around $25, but there is scarcely any business doing.

Scrap.—All the scrap that can be had finds ready buyers, on a basis of $21.50@$22 for No. 1 wrought, and $16.50 for best machinery scrap.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, July 18.

The chemical market this week, with few exceptions, is the usual midsummer market. In heavy chemicals the effect of the organization in England of the "Chemical Union" has been to stiffen prices here. In acids the trade continues as reported last week. In fertilizing chemicals everything is quiet.

Heavy Chemicals.—The chief topic of discussion among dealers in heavy chemicals has been the "Chemical Union," or combination of chemical manufacturers in England. Late cable advices inform us that the firm of Deacon & Co. has joined the Union, and as they were the last to hold back, the combination is apparently an assured fact. There are yet details to arrange, however, which, though seemingly unimportant of themselves, yet are often a great source of annoyance and discontent, and failure to agree on these points has ere this resulted in the collapse of half-formed unions and combinations. In this city the prevailing impression is that the organization of the "Chemical Union" will, without doubt, be perfected soon, in which case prices will rise.

From our Liverpool letter it will be seen that English consumers are taking time by the forelock, and are beginning to buy ahead of their requirements in anticipation of higher values. The demand has been more noticeable in caustic, which is already rising in price. The ashes are unchanged, there being but little demand for them at this season of the year.

Caustic soda, as before stated, has been the center of attraction during the week. For the 70 to 74 per cent. grade quotations are 2·90c.@3c., and the same price holds good for 76 to 77 per cent. Buyers are holding off in expectation of lower figures, but inasmuch as stocks are light and shipments from Europe cannot be made for less than above quoted the prospect of an immediate decline would seem rather remote.

Caustic Soda Ash.—There is not much doing in this article which is quoted at 1·50c.@1¾c.

Carbonated Soda Ash.—For 48 per cent., quotations are $1.50@$1.62½, and for 58 per cent., $1.45@$1.50, with a dull market in both.

Sal Soda.—English sal soda is quiet, with quotations as given last week, $1@$1.05.

Bleaching Powder.—Bleaching powder shows a slight betterment in prices, $1.35@$1.50, according to quantity and brand, now being quoted.

Acids.—Manufacturers of acids almost unanimously say that they are doing all the business they can attend to, and that so far as volume is concerned, the trade is everything that could reasonably be expected at this time of the year. Prices, however, are as low as ever, and consumers are being benefitted by the sharp competition between dealers. Rumors of very low prices are quite numerous, but as these are seldom accompanied by proofs, they are not taken as entirely reliable. Nevertheless, the disquieting effect of them is perceptible in the unsettled feeling anent prices which prevails among traders.

Nothing has occurred which will justify a change in the quotations given in this column for some weeks past, and we accordingly repeat them.

Acid, per 100 pounds in New York and vicinity: Acetic, $1.75@$2.25; muriatic, 18-degree, 80c.@$1.25; muriatic, 20-degree, 90c.@$1.50; muriatic, 22-degree, 90c.@$1.75; nitric, 36-degree, $2.75@$3.50; nitric, 40-degree, $3.25@$4.50; nitric, 42-degree, $3.75@$4.75; sulphuric, 60-degree, 70@80c., and sulphuric, 66-degree, 85c.@$1.

Fertilizing Chemicals.—To repeat our last week's quotations is about all that can be said regarding the market for fertilizers. Dealers are looking forward to the opening of the fall season, and until this comes they do not expect to do much. Prices show no changes, transactions not having occurred which have necessitated any alteration or shading. We accordingly quote: High grade dried blood, $1.90@$1.95. For the low grade the price is $1.80@$1.85; Azotine, $1.90@$1.95. Tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, $19@$20 per ton, and low grade 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, $18@$18.50. Fish scrap, $20.50@$21 per ton. f.o.b. factory. Sulphate of ammonia at $3.10@$3.15 per cwt. Concentrated tankage, $1.80@$1.85. Refuse, bone black, guaranteed 70 per cent. phosphate, $18.50@$19 per ton. Dissolved bone-black is nominally 95c. per unit for available phosphoric acid, although on large lots prices might be somewhat reduced, and acid phosphate 80c. per unit for available phosphoric acid. Steamed bones, unground, $20@$23; ground, $25@$26.

Charleston rock, undried, $5.75 per ton; kiln-dried, $7@$7.25 per ton, f. o. b. vessels and cars respectively at the mines. Freights by sail from Charleston to New York, $2.75@$3.50 per ton. Charleston rock, ground $11.50@$12, ex vessel at New York.

Quotations are for 48 to 52 per cent. sulphate of potash, $1.12½ per 100 pounds for shipments from date; high grade manure salts, basis 90 per cent. sulphate of potash, $2.37½ per 100 pounds.

Mr. Paul C. Trenholm, of Charleston, S. C., sends us the following interesting statistics showing shipments of phosphate rock from Charleston, S. C., June, 1888, 1889, 1890:

	1888.		1889.		1890.	
	Crude.	Gr'nd.	Crude.	Gr'nd.	Crude.	Gr'nd.
Domestic	16,497	nil	13,916	nil	14,297	188
Foreign	nil	nil	nil	nil	12,745	...
Aggregate					27,042	188

Muriate of Potash.—About 150 tons of muriate arrived during the week. The receipts are taken up upon arrival, and there is no accumulation of stocks. Quotations are unchanged at $1.77½@$1.85, according to quantity.

Nitrate of Soda.—Nitrate is quiet, and the market is weak at $1.67½@$1.70, ex-ship.

Brimstone—The market is quiet and prices show a tendency toward a decline. For July-August delivery, quotations are $20.25 for best unmixed seconds, and $19.75 for best unmixed thirds. For Spot and near due, quotations are $21@$20.50 for best seconds and thirds respectively.

Liverpool. July 9.

[Special Report by Messrs. J. P. Brunner & Co.]

Since our last, the talk with reference to the formation of the Chemical Union has become very confident. There are still several firms who decline to join.

In the belief, apparently that this union will be formed a large business has transpired in caustic soda, the market for which has been cleared for this month, and to a large extent for next two months also. Manufacturers decline to make sales beyond September, by whiah time they hope the Chemical Union will be accomplished. We are inclined to think, especially as the demand has run almost entirely on caustic soda to the exclusion of almost all other articles, that the business has been largely speculative.

Soda ash is quiet at 1 3-16 to 1¼ for caustic and 1¼ to 1⅝ for cart ash; according to brands.

Soda crystals firm at £3 5s. to £3 7s. 6d. per ton.

Caustic soda scarce, quotations for which range as follows: 60 per cent., £8 5s. to £8 7s. 6d per ton; 70 per cent., £9 10s. to £9 12s. 6d.; 74 per cent., £10 5s. to £10 10s.; 76 per cent., £11 to $11 5s.

Bleaching powder dull at £5 to £5 5s. per ton.

Chlorate of potash advanced to 4¾d. @ 5d. per pound.

Bicarb. soda firm at £5 15s. to £6 per ton and upward for one hundred weight kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of ammonia in fair demand for America, and sales at £11 12s. 6d. to £11 15s. for good gray 24 per cent. f. o. b. Liverpool, in double bags.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, July 18.

Bricks.—The trade in bricks has been active during the week under review. The demand has been very fair, but the supply still exceeds it, and brick is accumulating, though not at a very rapid rate. Our quotations this week are Haverstraw, $5.25@$6.25 per thousand; Uprivers, $5.25@$5.50 per thousand, with very few at $5.75; Jerseys, $4.50@$5 per thousand and Pales at $3@$3.25.

Lime.—The market in lime is quiet with only a moderate demand. Late advices are to the effect that no lime is being shipped from Rockland. Arrivals here are taken up within a day or two, lump lime being especially in demand. Quotations have not changed since our last issue, and we repeat them: Rockland, common and finishing, 90c. and $1.20; St. John, common and finishing, 85c.@95c.; Glens Falls, common and finishing, 85c.@$1.10.

IMPORTS AND EXPORTS OF METALS AT NEW YORK JULY 5 TO JULY 12 AND FROM JANUARY 1.

IMPORTS.

Spelter.	Week. Tons.	Year. Tons.
Amer. Metal Co		222
Hendricks Bros		50
La Marche's Sons, H		5
Lewisohn Bros		50
Meyer, G. A. & E		9
Milne & Co	74	74
Muller, Schall & Co		93
Total	74	503
Corres. date, 1889	70	458

Pig Lead.	Lbs.	Lbs.
Caswell, E. A		111
Hendricks Bros		50
Schultz & Co., A		98
G. W. Sheldon		149
Total		408
Corres. date, 1889		129

Tin.	Tons.	Tons.
Abbot, Jere, & Co		50
Amer. Metal Co		2,125
Bidwell & French	75	765
Bruce & Cook		10
Carter, Hawley & Co		50
Cohen, H		20
Cort & Co., N. L		50
Crooks & Co., R		75
Davol & Son		15
Hendricks Bros		26
Lehmaier, S., & Co.	25	92
Lewisohn Bros	10	20
Merchant & Co	10	20
Muller, Schall & Co		620
Naylor & Co		1,121
Nissen, Geo		10
Phelps, Dodge & Co		2,350
Thomson, A. A. & Co		30
Thomson, D. & Co		50
Townsend, & Co., J. R.	20	50
Trotter & Co, N		75
Total	140	7,624
Corres. date, 1889	782	6,199

Tin Plates.	Boxes.	Boxes.
Bruce & Cook	4,440	70,707
Byrne & Son		1,000
Central Stamp. Co.	1,488	45,934
Coddington & Co	806	65,795
Cohn & Co	187	12,262
Con. Fruit Jar Co		120
Corbiere F. & Co	195	6,267
Cort & Co	3,352	88,186
Crooks & Co	3,029	36,096
De Milt & Co, H R	1,494	2,694
Dickerson, V. D. & Co	11,292	198,708
Fenton, D. E		260
Haberman, F		66
Herring, Chas. E		1,000
Iron Clad Mfg. Co		379
Lalance & G. M. Co.	417	8,333
Lazard Bros		1,048
Lehmaier, Schw'z & Co		200
Merchant & Co	2,005	14,514
Mersick & Co	387	6,447
Morewood & Co	272	35,492
Newell Bros		416
Payne, S. H. & Co		684
Pratt Mfg. Co	4,492	66,996
Phelps, Dodge & Co	5,579	423,904
Shepard & Co	712	3,119
Taylor, N. & G		1,229
Thomson & Co., A. A.	5,778	71,061
Warren, J. M		3,530
Wheeler & Co	1,114	15,399
Whittemore & Co		12,053
Wolff & Reesing		2,077
Wright, Peter & Co		227
Total	47,039	1,196,406
Corres. date, 1889	50,791	1,338,506

Pig Iron.	Tons.	Tons.
Abbott & Co, Jere	100	200
Baldwin & Co., A	300	607
Baldwin Bros. & Co		170
Crocker Bros		900
Crooks & Co., R		5
Dana & Co		150
Geisenheimer & Co		76
Hagermeyer & Brun		30
Irvin. R. I. & Co	50	300
Lillienberg, N		1,909
Naylor & Co		150
Pierson & Co		30
Sheldon, G. W. & Co		200
Stetsson & Co., G. W.	100	1,725
Williamson, J. & Co.	50	1,250
Total	600	7,702
Corres. date, 1889	950	15,081

Steel Blooms, Billets, and Slabs.	Tons.	Tons.
Baldwin Bros. & Co		2
Dana & Co		1,356
Downing, R. F. & Co		5
Henderson Bros		1
Martin & Co		80
Milne, A., & Co		68
Pope, Jas. E., Jr.		61
Richards & Co., C. B.	1	1
Roebling's Sons, J. A.	36	2,059
Wolff, & Co., R. H.		60
Total	361	3,693
Corres. date, 1889	1,299	49,208

Bar Iron.	Tons.	Tons.
Abbott & Co., Jere.	6	496
Bacon & Co		843
Crocker Bros		77
Dickerson, Van Dusen & Co		6
Downing & Co		285
E. J. Jacobus		7
Fuller, Dana & Fitz		11
Holt, H. N		60
Lillienberg, N		447
Lundberg, G		1,587
Milne & Co		794
Muller, Schall & Co		289
Naylor & Co	260	283
Page, Newell & Co		1,462
Plenty, J		14
Wilson, J. G		3
Total	266	6,665
Corres. date, 1889	941	4,626

Scrap Iron.	Tons.	Tons.
Crossman & Co., W. H.		30
Muller, Schall & Co		18
Samper & Co., S.		186
Stevens, Corvin & Co		30
Ward, J. E. & Co.	100	492
Total	100	756
Corres. date, 1889		1,058

Steel and Iron Rods.	Tons.	Tons.
Abbott & Co	280	6,099
American S. Co	100	665
Bacon & Co		73
Carey & Moen	8	264
Cooper, Hewitt & Co		371
Dana & Co	50	498
Downing & Co		81
Galpin, S. A		1,066
Greely & Co. C. S.		35
Hazard Mfg. Co	23	263
Jacobus, E. Y		2
Lee, James & Co		1,249
Lillienberg, N		300
Lundberg, G		126
Milne & Co		456
Muller, Schall & Co.	75	682
Naylor & Co	71	3,775
Page, Newell & Co		1,129
Roebling's Sons, J. A.	130	2,027
Schulze & R		1
Temple & Lockwood		6
Wiebusch & Ho		4
Wood & Niebuhr		25
Wolf & Co., R. H		2,733
Total	737	21,930
Corres. date, 1889	1,074	28,558

Old Rails.	Tons.	Tons.
Bowring & Archibald		340
Frankfort. M	300	3,582
Henderson Bros		300
Hernsheim, L		350
Mosle Bros		123
Naylor & Co		1,968
Sawyer, Wallace & Co		610
Total	300	7,273
Corres. date, 1889		9,135

Spiegeleisen.	Tons.	Tons.
Abbott, Jere & Co		2,725
Blakely & McLellan		1,684
Crocker Bros	1,158	14,391
Crooks & Co., R		106
Dana & Co	250	14,567
Foley, F		50
Geisenheimer & Co.	30	338
Hernsheim, L	467	14,035
Holt, H. N		200
Naylor & Co		9,906
Perkins, C. L		1,100
Sachs & Richmond		2
Whittemore, H. & Co		40
Total	1,905	59,444
Corres. date, 1889	1,537	42,149

Iron Ore.	Tons.	Tons.
Baiz, Jacob		67
Bowring & Archibald		3,092
Earnshaw, A		3,193
Ennis, Andrew		438
Flores & Co., R. de		10,548
Johnson & Co., L		5,030
Total		22,368
Corres. date, 1889		7,970

EXPORTS.

Copper.	Pounds.	Pounds.
Abbott & Co., Jere		2,074,698
Amer. Met. Co., L		881,808
Barber & Co		13,750
Belmont, Aug. & Co		1,763,974
Burgass & Co		173,734
French, Edye & Co		135,374
Heidelbach, Sicheimer & Co		672,608
Seamen, S. H		66,950
Ward, J. E. & Co		100,000
Wilms & T'hune		112,004
Total		5,999,900
Corre. date, 1889	1,130,887	4,292,484

Copper Matte.	
American Metal Co	2,523,079
Lewisohn Bros	1,500,103
Nichols, Geo. H	267,202
Paulsen, Wm	1,039,428
Wilms & T'hune	2,848,706
Total	8,178,518
Corres. date 1889	2,300,865 15,113,339

DIVIDEND-PAYING MINES.

	NAME AND LOCATION OF COMPANY.	CAPITAL STOCK.	SHARES. No.	SHARES. Par	ASSESSMENTS. Total levied	ASSESSMENTS. Date and amount of last.	DIVIDENDS. Total paid.	DIVIDENDS. Date and amount of last.	
1	Adams & L..... Colo.	$1,500,000	150,000	$10	*	....	$555 000	Jan. 1887	.15
2	Alice, s. c Mont	10,000,000	400,000	25	*	....	850,000	July 1890	.06¼
3	Alma&Nel Wood C.,g Idah	300,000	30,000	10	*	....	60,000	Jan 1 89	.50
4	American & Nettie,c. Colo.	.....	300,000	..	.....	....	150,000	Nov 1889	10
5	Amy & Silversmith,s. Mon.	.....	341,419	..	.....	....	247,530	Aug. 1887	12½
6	Atlantic, c ..... Mich	1,000,000	40,000	25	$280,000	Apl. 1875	$1.00	620,000	Feb 1890	1.50
7	Argenta, s ..... Nev.	10,000,000	100,000	100	335,000	July 1889	.10	40,000	Feb. 1880	.20
8	Aspen Mg. & S., s. L. Colo.	2,000,000	200,000	10	*	....		440,000	Jun 1890	.10
9	Aurora, L..... Mich	2,000,000	100,000	20	*	....		155,000	Oct. 1887	1.87½
10	Badger, s..... Ont.	250,000	50,000	5	.....	....		37,500	Mar. 1890	.25
11	Bassick, c. s..... Colo.	10,000,000	100,000	100	*	....		400,000	Mar. 1884	1.00
12	Belle Isle, s..... Nev.	10,000,000	100,000	100	.....	....		300,00.	Dec 1879	.25
13	Belcher, c. s..... Nev.	10,400,000	104,000	100	2,028,000	Apl. 1889	50	15,397,000	Apl. 1879	1.00
14	Bellevue Idaho, s. L. Idah.	1,250,000	125,000	10	120,000	Dec. 1889	25	2 0,000	Jan. 1887	.10
15	Bodie Con., c. s..... Cal	10,000,000	100,000	100	575,000	Nov 1889	25	1,602,572	Apl. 1885	.50
16	Boston & Mont, c..... Mon	2,500,000	250,000	10	*	....		520.000	Jun 1886	.15
17	Boston & Mont., c.s. Mon	2,500,000	100,000	25	*	....		1,300,000	May 1890	1.00
18	Breece, s..... Colo	5,000,000	200,000	25	*	....		2,000	Feb. 1880	.01
19	Brooklyn Lead, L. s. Utah	500,000	50,000	10	.....	....		127,000	July 1887	.05
20	Bulwer, c..... Cal.	10,000,000	100,000	10	130,000	Aug. 1889	.25	175 000	Jan. 1890	.10
21	Bunker Hill & Sull.... Idah.	3,000,000	300,000	10	*	....		150,000	Oct. 1883	.06½
22	Caledonia, c. s..... Dak.	10,000,000	100,000	100	505,000	May 1885	.15	160.000	Jun, 1890	.08
23	Calliope, s..... Colo.	1,000,000	1	1	.....	....		90,000	Apl. 1890	.01
24	Calumet & Hecla, c . Mich	2,500,000	100,000	25	1,200,000	....		34,350,000	May 1890	5.00
25	Carbonate Hill s. L.. Colo.	1,500,000	200,000	10	*	....		80,000	Apl. 1884	.05
26	Carlisle, c..... N. M	1,000,000	200,000	5	.....	....		175,000	Dec. 1888	.12½
27	Castle Creek, s..... Idah.	100,000	100,000	1	*	....		51,000	Oct. 1883	.03
28	Catalpa, s. L..... Colo.	3,000,000	300,000	10	*	....		270,000	May. 1884	.10
29	Central, c..... Mich	500,000	20,000	25	100,000	Sept 1861	.06	1,950,000	Feb. 1890	1.00
30	Chrysolite, s. L.... Colo	10,000,000	200,000	50	*	....		1,650,000	Dec 1884	.25
31	Colorado Central, s. L Colo.	2,750,000	275,000	10	*	....		406,250	Aug. 1889	.05
32	Confidence, s. L..... Nev.	.....	24,980	....	306,160	Mar. 1890	.75	199,680	Apl. 1889	1.00
33	Cons. Cal. & Va., s. L. Nev.	21,600,000	216,000	100	108,000	Jan. 1885	.20	3,466,800	Apl. 1890	.25
34	Contention, s..... Ariz.	12,500,000	250,000	50	.....	....		‡2,537,500	Dec. 1884	.25
35	**Cop. Queen Cons, c. Ariz.	1,400 000	140,000	10	.....	....		210,000	Feb. 1889	.50
36	Crescent, s. L. g. ... Utah	15,000,000	600,000	25	.....	....		228,000	Oct. 1888	.03
37	Crown Point, g. s.. Nev.	10 000.000	100,000	100	2,850,000	Sept 1889	.50	11,588 000	Jan. 1875	2.00
38	Daly, s. L..... Utah	3,000,000	150,000	20	*	....		1,575,000	July 1890	.25
39	Deer Creek, c. g..... Idah.	1 000,000	200,000	5	*	....		20,000	Jun. 1889	.05
40	Deadwood Terra., g. Dak.	5,000,000	100,000	50	*	....		11,000,000	Nov 1887	.10
41	Derbec B. Grav., g. s. Cal.	10,000,000	100,000	100	90,000	Dec. 1881	.10	210.000	Oct 1889	.10
42	Dunkin, s. L..... Colo.	5,000,000	200 000	25	*	....		390,000	Oct. 1889	.05
43	Dunstone, g. S. L.... Mont	1,000,000	200,000	5	.....	....		6,000	Nov. 1888	.03
44	Eclipse..... Colo.	100,000	100,000	1	.....	....		20,000	Nov. 1887	.10
45	Elkhorn, g. s..... Mont	1,000,000	100,000	10	50,000	July 1883	.50	850,000	July 1887	.05
46	Empire, L. s..... Mont	500,000	100,000	5	.....	....		70,500	Oct. 1887	.37½
47	Eureka Con., g. s. L. Nev.	5,000,000	50,000	100	550,000	Jun. 1889	.50	4,967,500	Aug. 1890	.25
48	Evening Star, s. L.... Colo.	500,000	50,000	10	*	....		1,45 .000	Dec. 1889	.25
49	Excelsior, g..... Cal.	10,000,000	100,000	100	560,000	Sept 1885	1.00	875,000	Oct. 1880	.25
50	Father de Smet, g.. Dak.	10,000,000	100 000	100	200,000	Nov 1878	1.00	1,125,000	Dec. 1885	.20
51	Franklin, c..... Mich	1,000,000	40,000	25	220,000	Jun. 1871		950,000	Jan. 1889	2.00
52	Freeland, g. s. c..... Colo	5,000,000	200,000	25	*	....		190,000	July 1886	.10
53	Garfield, L., g. s..... Nev.	500,000	50,000	10	.....	....		95,000	Apl. 1886	.12½
54	Gould & Curry, g. s. Nev.	10,300,000	103,000	100	4,465,500	Apl. 1890	.50	926,800	Oct. 1870	10.00
55	Grand Prize, s..... Nev.	10,000,000	100,000	100	715,000	Nov. 1889	.30	525,000	Jan. 1890	.30
56	Granite, s. L..... Idah.	500,000	500,000	1	*	....		28.4 00	Oct. 1889	.02
57	Granite Mountain, s. Mont	10,000,000	400,000	25	.....	....		8,400,000	Mar. 1890	.50
58	Green Mountain, g... Cal.	1,250,000	125,000	10	.....	....		212,000	Nov. 1881	.07½
59	Hale & Norcross, g. s Nev.	11,200,000	112,000	100	5,036,000	July 1887	.50	1,162,000	July 1888	.50
60	Hecla Con., s. g. L. c. Mont	1,500,000	30,000	50	.....	....		1,500,000	Apl. 1889	.50
61	Hel'a Mg & Red, g.s.L Mont	3,315,000	663,000	5	.....	....		197,970	July 1886	.06
62	Holmes, s..... Nev.	10,000,000	100,000	100	325,000	Mar. 1890	.25	75,000	Apl. 1886	.25
63	Holyoke, g..... Utah	200,000	200,000	1	.....	....		27 000	Feb. 1883	.10
64	Homestake, g..... Dak.	12,500,000	125,000	100	200,000	July 1878	1.00	5,568,750	July 1890	.10
65	Honorine, s. L..... Utah	500,000	250,000	2	37,500	Apl. 1889	.05	125,000	Sept 1887	.05
66	Hope, s..... Mont	1,000,000	100,000	10	*	....		233,250	Oct. 1888	.25
67	Horn-Silver, s. L.... Utah	10,000,000	400,000	25	*	....		4,150,000	Jun. 1890	.12½
68	Hubert, g..... Colo.	1,000,000	1 mil'n	1	*	....		247.000	Dec. 1889	.00½
69	Idaho, g..... Cal.	310,000	3,100	100	.....	....		5,235,900	Dec. 1889	5.00
70	Ideal, s. L..... Colo.	1,500,000	50,000	10	.....	....		15.000	Oct. 1886	.05
71	Illinois, s..... N. M.	100,000	100,000	1	*	....		45,000	Apl. 1889	.20
72	Independence, s..... Nev.	10,000,000	100,000	100	340.000	Oct. 1886	.20	225,000	Sept 1879	.25
73	Iron Hill, s..... Dak.	2,500,000	250,000	10	134,000	July 1889	.03	156,250	Nov 1887	.07½
74	Iron-Silver, s. L .... Colo.	10,000,000	500,000	20	*	....		2,500,000	Apl. 1889	.20
75	Jackson, g. s..... Nev.	5,000,000	50.000	100	237,500	Nov 1880	.30	55,000	Jun 1889	.10
76	Jay Gould, s..... Mont	2,000,000	40,000	5	*	....		495,000	May 1890	.04
77	Jocuistitla, g ..... Mex.	2,500,000	250,000	10	.....	....		1,200,000	Feb. 1886	.50
78	Jumbo, g..... Nev.	2,000,000	500,000	10	*	....		35.000	Oct. 1887	.02½
79	Kearsarge, g..... Mich	1,250,000	50,000	25	190,000	Oct. 1887	1.60	190,000	Jan 1890	2.00
80	Kentuck..... Nev.	3,000,000	30,000	100	369,000	Dec. 1889	.30	1,350,000	Dec. 1886	.10
81	La Plata, s. L..... Colo.	2,000,000	200,000	10	*	....		610,000	Sept 1882	.30
82	Leadville Cons., s. L. Colo.	4,000,000	400,000	10	*	....		423,000	Apl. 1889	.05
83	Lexington, g. s..... Mont	4,000,000	40,000	100	.....	....		609,000	Jan. 1885	2.00
84	Little Chief, s. L.... Colo.	10,000,00	200,000	50	*	....		810,000	Jan. 1890	.05
85	Little Pittsburg, s. L. Colo.	20,000,000	200,000	100	*	....		1,000,000	Dec. 1889	.50
86	Martin White, s..... Nev.	10,000,000	100,000	100	100,000	Feb. 1890	.25	140.000	Dec. 1886	.25
87	Mary Murphy, g. s... Colo.	350,000	3,500	100	*	....		175,000	May 1888	5.00
88	Matchless, s..... Colo.	500,000	500,000	1	*	....		15,000	Feb. 1890	.00½
89	May Maseppa..... Colo.	1,000,000	100,000	1	*	....		10,000	July 1890	.01
90	Minnesota, c..... Mich	1,000,000	40,000	25	420,000	Apl. 1886	1 00	1,826,000	Mar. 1876	.....
91	Mono, c..... Cal.	5,000,000	50,000	100	102,850	Nov. 1889	.25	12,529	Mar. 1888	.25
92	Montana, L., g. s. c. Mont	3,300,000	660,000	5	*	....		2,465,130	Apl. 1890	.06
93	Morning Star, s. L.... Colo.	1,000,000	100,000	10	.....	....		850,000	Dec. 1889	.20
94	Moulton, s. g..... Mont	2,000,000	400,000	5	*	....		380,000	Dec. 1887	.07½
95	Mount Pleasant, g.... Cal.	150,000	150,000	1	*	....		150,000	Feb. 1887	.30
96	Mt. Diablo, s..... Nev.	5,000,000	50,000	100	137,500	Jun. 1880	2.00	165,000	Oct 1889	.20
97	Napa, q ..... Cal.	700,000	100,000	7	.....	....		385,000	Apl. 1890	.10
98	Navajo, g..... Nev.	10,000,000	100,000	100	485,000	Apl. 1888	.30	1,565,000	Apl. 1889	.10
99	New Guston, s..... Colo.	500,000	100,000	5	*	....		287,500	Dec. 1889	.87½
100	N. Hoover Hill, g. s.. N. C.	300,000	120,000	2½	.....	....		30,000	Dec. 1885	.06½
101	Northern Belle, s.... Nev.	5,000,000	50,000	100	425,000	Jan. 1884	3.30	2,400,000	Apl. 1883	.50
102	North Belle Isle, s.... Nev.	10,000,000	100,000	100	400,000	Sept 1889	.20	230.000	May 1888	.50
103	North Star, g..... Cal.	1,000,000	100,000	10	.....	....		250.000	Dec. 1889	.50
104	Ontario, s. L..... Utah	15,000,000	150,000	100	.....	....		11,150 000	July 1890	.10
105	Ophir, g. s..... Nev.	10,000,000	100,000	100	4,159,440	May 1889	.50	1,440,840	July 1882	1.00
106	Original, s. c..... Mont	1,500,000	60,000	25	*	....		123,000	July 1888	.05
107	Osceola, c..... Mich	1,250,000	50,000	25	480,000	Apl. 1876	1.60	1,322,500	Jun. 1890	1.00
108	Oxford, g..... N. S.	125,000	125,000	1	*	....		78,500	Sept 1888	.02
109	Paradise Valley, g. s Nev.	10,000,000	100,000	100	57,000	Apl. 1888	.15	150.000	Apl 1887	.10
110	Parrot, c..... Mont	1,800,000	180,000	10	.....	....		588,000	May 1890	.10
111	Pescock, g..... N. S.	2,000,000	100,000	10	.....	....		80,000	Jun. 1886	.....
112	Plumas Eureka, g.... Cal.	1,406,250	140,625	10	.....	....		2,548,946	Oct. 1889	.37½
113	Plutus, g. s. c. L.... Colo.	2,000,000	200,000	10	.....	....		20,000	Feb. 1886	.10
114	Plymouth Con., g.... Cal.	5,000,000	100,000	50	.....	....		2.280.000	Feb. 1888	.40
115	Quicksilver, pref., g. Cal.	4,300,000	43,000	100	.....	....		1,641,422	May 1890	1.50
116	" com., g. Cal.	5,700,000	57,000	100	.....	....		643,867	July 1882	.40
117	Quincy, c..... Mich	1,000,000	40,000	25	200,000	Dec. 1862		5,370,000	Jan 1890	3.00
118	Republic, c..... Mich	5,000,000	100,000	50	400,000	Dec. 1889	.30	4,312,587	Jun. 1890	1.25
119	Richmond, s. L..... Nev.	1,350,000	54,000	25	*	....		99,785	Feb. 1889	.50
120	Ridge, c..... Mich.	500,000	20,000	25	219,939	Mar 1886	.50	585,000	Mar. 1886	.05
121	Robinson Con., s. L... Colo.	10,000,000	200,000	50	*	....		100,000	Dec. 1882	.50
122	Robert E. Lee, s. L... Colo	10,000,000	500,000	20	.....	....		4,460,000	July 1889	3.00
123	Savage, s..... Nev.	11,200,000	112,000	100	6,542,000	July 1889	.50	7,500	Apl. 1883	.01
124	Shoshone, L..... Idah.	150,000	150,000	1	.....	....		1,568,140	Apl. 1888	.33½
125	Sierra Buttes, g..... Cal.	2,225 000	122,500	10	.....	....		102,000	Jan. 1871	1.00
126	Sierra Nevada, g. s. Nev.	10,000,000	100,000	100	6,250,000	Oct. 1889	.50	270,000	Apl. 1889	.10
127	Sierra Nevada, s. L. Idaho	1,000,000	1	1	.....	....		40,000	May 1889	02
128	Silver Cord, g. s. L.. Colo.	4,500,000	450,000	10	.....	....		270,000	Apl 1889	.10
129	Silver King, s..... Ariz.	10,000,000	100,000	100	80,000	Jan. 1890	.30	1,950,000	July 1887	.25
130	Silver Mg. of L..... N. M.	500,000	500,000	1	.....	....		100.000	Apl. 1889	.10
131	Silverton, g. s. L.... Colo.	2,000,000	200,000	10	*	....		1,560,000	Jan 1881	.25
132	Small Hopes Cons., s. Colo.	5,000,000	250,000	20	*	....		3,137,500	Jun 1889	.10
133	Spring Valley, g..... Cal.	200,000	200,000	1	50,000	Oct. 1886	.25	3,595,000	Jun. 1888	.05
134	Standard, g. s..... Cal.	10 000,000	100,000	100	50,000	Feb. 1890	.25	155,000	Nov. 1881	.05
135	Stormont, s ..... Utah	500,000	500,000	1	*	....		844.00.	Dec. 1887	.20
136	St. Joseph, L ..... Mo..	1,500,000	150,000	10	*	....		9,000	Apl. 1888	.02½
137	Swansea, g..... Colo.	900,000	90,000	10	.....	....		100,000	Nov 1881	.20
138	Tamarack, c..... Mich.	1,000,000	40,000	25	520,000	Apl. 1886	3.00	1,560,000	July 1890	3.00
139	Tip Top, s ..... Ariz.	10,000,000	100,000	100	250,000	Sept 1883	.25	1,250,000	Apl. 1884	.20
140	Tombstone, g. s. L.. Ariz.	12,500,000	500,000	25	*	....		97,500	Feb. 1886	2.50½
141	United Verde, c .... Ariz.	3,000,000	300,000	10	*	....		37.500	Apl 1888	.37½
142	Valencia, m..... N. H.	150,000	1,500	100	.....	....		272,500	Oct. 1887	.10
143	Viola Con., s. L..... Idah.	750,000	150,000	5	*	....		1,337,500	Nov. 1888	.25
144	Ward Cons., s. L.... Colo.	4,000,000	200,000	10	.....	....		21,000	Dec. 1889	.05
145	Yankee Girl ..... Colo.	2,500,000	250,000	10	.....	....		1,275,000	 1888	.10
147	Yellow Jacket, g. s. Nev.	12,000,000	120,000	100	5,500,000	Mar 1889	.50	4 400	July 1889	.10
148	Webb City, L. Z.... Mo..	55,000	11,000	5	.....	....		25,000	Oct. 1889	.25
149	Woodside..... Utah	.....	.....	...	.....	....		175,000	 1889	.10

NON-DIVIDEND-PAYING MINES.

	NAME AND LOCATION OF COMPANY.	CAPITAL STOCK.	SHARES. No.	SHARES. Par Value.	ASSESSMENTS. Total levied.	ASSESSMENTS. Date & am't of last.	
1	Agassiz Cons., s. L.. Colo.	$2,500,000	50,000	$50	*	....	
2	Alleghany, s..... Colo.	5,000,000	500,000	10	.....	....	
3	Allouez, c..... Mich	2,000,000	80,000	25	$737,000	Jan. 1890	...
4	Alpha Con., g. s.... Nev.	3,000,000	30,000	100	583,750	July 1889	.75
5	Alta, s..... Nev.	10,080,000	100,800	100	2,248,800	Sept 1888	.50
6	Amador, g..... Cal.	400,000	200,000	2	*	....	.60
7	American Flag, s... Colo.	1,250,000	125,000	10	300,000	Jun 1877	.10
8	Amity, s..... Colo.	250,000	250,000	1	.....	....	...
9	Anglo-Montana, Ld.. Mon.	600,000	120,000	5	.....	....	...
10	Astoria, g..... Cal.	200,000	100,000	2	.....	....	...
11	Barcelona, g..... Nev.	5,000,000	200,000	25	*	....	...
12	Bechtel Con., g..... Cal.	10,000,000	100,000	100	173,500	Jan. 1883	.10
13	Belmont, s..... Nev.	5,000,000	50,000	100	735.000	Apl. 1886	.25
14	Bess & Belcher, g. s. Nev.	10,080,000	100,800	100	2,180,500	Jan. 1890	...
15	Big Pittsburg, s. L.. Colo.	20,000,000	200,000	100	*	....	...
16	Bi-Metallic, s..... Mon.	5,000,000	200,000	25	*	....	...
17	Black Oak, g..... Cal.	3,000,000	300,000	10	*	....	...
18	Boston Con., g..... Cal.	10,000,000	100,000	100	170,000	Nov 1883	.25
19	Bremen, s..... N. M.	5,000,000	500,000	10	*	....	...
20	Brownlow, s ..... Colo.	250,000	250,000	1	.....	....	...
21	Brunswick, g..... Cal.	2,000,000	400,000	5	*	....	...
22	Bullion, g. s..... Nev.	10,000,000	100,000	100	4,007,000	Aug. 1888	.50
23	Calaveras, g. s.... Cal.	500,000	500,000	1	*	....	...
24	Carisa, g..... Wy.	500,000	100,000	5	*	....	...
25	Carupano, g. s. L. c. Ven.	200,000	100,000	2	*	....	...
26	Cashier, g. s..... Colo.	500,000	250,000	2	*	....	...
27	Challenge Consolidated, g. s. Idah.	1,250,000	250,000	5	*	....	...
28	Cherokee, g..... Cal.	1,500,000	150,000	10	*	....	...
29	Chollar, s..... Nev.	11,200,000	112,000	100	1,484,000	July 1889	.50
30	Cleveland, T..... Dak.	1,000,000	500,000	2	*	....	...
31	Colchis..... N. M.	500,000	50,000	10	.....	....	...
32	Commonwealth, s.. Nev.	10,000,000	100,000	100	170,000	Nov 1888	.50
33	Comstock, g. s..... Nev.	10,000,000	100,000	100	30 000	Mar. 1887	.15
34	Con. Imperial, g. s. Nev.	5,000,000	50,000	100	1,902,500	Nov 1888	.05
35	Con. Pacific, g..... Cal.	6,000 000	60,000	100	192,000	Oct. 1889	.10
36	Cons. Silver, s..... Mo..	2,500,000	250,000	10	*	....	...
37	Crescent, s. L..... Colo.	3,000,000	300,000	10	*	....	...
38	Crocker, s..... Ariz.	10,000,000	100,000	100	135,000	Jan. 1890	.10
39	Crowell, g..... N. C.	500,000	500,000	1	*	....	...
40	Dahlonega, g..... Ga....	250,000	250,000	1	*	....	...
41	Dandy, s..... Colo.	5,000,000	500,000	10	*	....	...
42	Decatur, s..... Colo.	1,500,000	300,000	5	*	....	...
43	Denver City, s. L .. Colo.	5,000,000	500,000	10	*	....	...
44	Denver Gold, g..... Colo.	300,000	60,000	5	*	....	...
45	Durango, g..... Colo.	500,000	500,000	1	*	....	...
46	Eagle Mg. Co., Lt. N. S.	1,500,000	150,000	10	990,000	Mar. 1886	1.00
47	El Cristo, g. s..... U.S.C	1,000,000	500,000	2	*	....	...
48	El Dorado, g..... Cal.	1,000,000	250,000	4	*	....	...
49	El Talento, g..... U.S.C	1,000,000	500,000	2	*	....	...
50	Empire, s..... Utah	10,000,000	100,000	100	*	....	...
51	Eureka Tunnel, s. L. Nev.	10,000,000	100,000	100	*	....	...
52	Exchequer..... Nev.	10,000,000	100,000	100	515,000	Apl. 1889	.25
53	Fownt Pittsburg, g.s. Nev.	10,000,000	100,000	100	30,530	Apl. 1889	2½
54	Gogebic L. Syn., l .. Wis.	5,000,000	200,000	25	*	....	...
55	Gold Cup, s..... Colo.	500,000	500,000	1	*	....	...
56	Golden Era, s..... Mon.	2 000,000	200,000	10	*	....	...
57	Gold Placer, g..... Colo.	5,000,000	200,000	25	239,314	Dec. 1885	.25
58	Gold Rock, g..... Cal.	1,000,000	500,000	2	*	....	...
59	Goodshaw, g..... Nal.	10,000,000	100,000	100	*	....	...
60	Grand Belt, c..... Tex.	12,000,000	120,000	100	*	....	...
61	Grand Duke..... Colo.	800,000	80,000	10	*	....	...
62	Great Remance, g... U.S.C	1,000,000	500,000	2	*	....	...
63	Gregory-Bobtail, g.. Colo.	550,000	550,000	1	*	....	...
64	Gregory Con., g.... Mon.	3,000,000	300,000	10	*	....	...
65	Green Mt. & Con. Co.e. Cal.	1,000,000	200,000	5	*	....	...
66	Head Cen. & Tr. s.g. Ariz.	10,000,000	100,000	100	*	....	...
67	Hector, g..... Cal.	1,500,000	300,000	6	45,000	Jan. 1889	.15
68	Highland, c..... Mich	500,000	25,000	20	*	....	...
69	Hollywood..... Cal.	200,000	100,000	2	*	....	...
70	Hortense, s..... Colo.	2,000,000	200,000	10	*	....	...
71	Huron, c..... Mich	1,000,000	40,000	25	280,000	May 1887	3.00
72	Iron Gold & Silver, g Nev.	2,000,000	200,000	10	*	....	...
73	Ironton, l..... Wis.	1,000,000	40,000	25	*	....	...
74	Iroquois, c ..... Mich	1,250,000	50,000	25	*	....	...
75	J. D. Reymert..... Ariz.	10,000,000	100,000	100	*	....	...
76	Julia Cons., g. s.... Nev.	11,000,000	110,000	100	1,660,000	Jan. 1889	.10
77	Lacrosse, g..... Colo.	1,000,000	100,000	10	*	....	...
78	Lee Classis, s..... Colo.	5,000,000	500,000	10	*	....	...
79	Mayflower Gravel.. Cal.	1,000,000	100,000	10	585,000	Mar. 1890	.50
80	Medora, g..... Dak.	250,000	250,000	1	*	....	...
81	Mexican, g. s ..... Nev.	10,000,000	100,000	100	2,800,760	Dec. 1889	.25
82	Middle Bar g..... Cal.	400,000	200,000	2	*	....	...
83	Mike & Starr, s. L.. Colo.	1,000,000	200,000	5	*	....	...
84	Mollie Gibson..... Colo.	2,000,000	1,100,000	2	*	....	...
85	Monitor, g..... Colo.	100,000	100,000	1	*	....	...
86	Mutual Mg. & Sm.. W'sh	100,000	100,000	1	*	....	...
87	Native, c..... Mich	1,000,000	40,000	25	*	....	...
88	Neath, g..... Colo.	1,000,000	100,000	10	*	....	...
89	Nevada Queen, s.... Nev	10,000,000	100,000	100	250,000	Oct. 1889	.25
90	New Germany, g .... N. S.	100,000	100,000	1	*	....	...
91	New Monarch, g. L. Colo.	2,000,000	200,000	10	*	....	...
92	N. Commonw'h, g. s.. Nev.	10,000,000	100,000	100	60,000	Apl. 1889	...
93	North Standard, g.. Cal.	10,000,000	100,000	100	20,000	Nov 1888	...
94	Noonday..... Cal.	600,000	60,000	10	208,000	Dec. 1881	1.0
95	Oneida Chief, g..... Cal.	500,000	125,000	100	*	....	...
96	Oriental & Miller, s. Nev.	10,000,000	400,000	25	*	....	...
97	Osceola, g..... Nev.	5,000,000	500,000	10	*	....	...
98	Overman, g. s..... Nev.	11,520,000	115,200	100	3,823,460	Dec. 1889	...
99	Park, s..... Utah	2,000,000	200,000	10	*	....	...
100	Peer, s..... Ariz.	10,000,000	100,000	100	155,000	Sept 1889	.10
101	Peerless, s..... Ariz.	10,000,000	100,000	100	370,000	Mar 1889	.25
102	Phenix..... Ariz.	500,000	500,000	1	*	....	...
103	Phœnix, g. s..... Ark.	5,000,000	200,000	25	*	....	...

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	July 12 H.	July 12 L.	July 14 H.	July 14 L.	July 15. H.	July 15. L.	July 16 H.	July 16 L.	July 17. H.	July 17. L.	July 18 H.	July 18 L.	SALES.
Adams, Colo.	...	...	.95	....	....	....	....	....	....	....	1.20	1.16	900
Argenta, Nev.	.13	.....	.13	....	....	....	....	....	....	....	....	....	500
Atlantic, Mich	25,25	....	....	....	....	....	....	....	....	....	....	....	400
Belle Isle, Nev.	1 60	....	....	....	....	....	1.45	....	....	....	1.10	....	500
Bodie Cons., Cal.	1.0	.....	1.00	....	....	....	....	....	....	....	....	....	4 0
Bos. & Mont., Mont.	....	.....	....	....	64 25	....	....	....	....	....	....	....	25
Breece, Colo.	....	.....	....	....	....	....	.83	.80	....	....	....	....	1,100
Bulwer, Cal	.20	.....	....	....	....	....	....	....	....	....	.30	....	400
Caledonia	2.60	.....	....	....	....	....	....	....	....	....	2.00	....	2 0
Calumet & Hecla.	306¼	.....	....	....	3 9½	....	....	....	....	....	....	....	30
Catalpa	.50	.....	....	....	....	....	....	.45	....	....	....	....	300
Colorado Central	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Confidence, Nev.	8.88	.....	....	....	8.88	....	....	....	....	....	....	....	200
Consol. Cal. & Va., Nev.	4.50	4 30	4 50	4 40	....	....	4.25	....	....	....	....	....	1,375
Crown Point, Nev	3 00	.....	....	....	....	....	....	....	....	....	....	....	150
Deadwood, Dak	....	.....	....	....	....	....	....	1.40	....	....	....	....	100
Dunkin, Colo.	....	....	57	.55	....	....	....	....	....	....	....	....	1, 00
Eureka Con	4 00	....	....	....	....	....	4 00	....	....	....	....	....	150
Excelsior, Cal	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Father de Smet	.40	.....	....	....	....	....	....	....	.32	....	....	....	300
Franklin	....	.....	....	....	....	24.13	....	....	....	....	....	....	100
Freeland, Colo.	.49	.40	.47	.40	.47	.46	.45	.40	.46	.44	.48	.47	10,100
Gould & Curry, Nev.	2 6	....	....	....	....	....	....	....	....	....	....	....	100
Hale & Norcross, Nev.	....	.....	....	....	3 40	....	....	....	....	....	....	....	100
Holyoke	....	.....	....	....	....	.04	....	....	....	....	....	....	100
Homestake, Dak.	....	....	10 25	....	....	....	....	....	....	....	....	....	50
Horn Silver Pr	3.40	....	3 40	3 30	3.40	3 37	3.40	3 35	3.50	....	....	....	3,500
Independence, Nev	.30	.....	....	....	....	....	....	....	....	....	....	....	100
Iron Silver, Colo.	....	.....	....	....	....	....	....	....	.55	....	....	....	100
Kearsarge	....	.....	....	....	26 13	....	....	....	....	....	....	....	20
Lead C., Colo.	.16	.15	16	.15	.17	.15	.16	....	.16	....	.16	.15	17,900
Little Chief, Colo.	34	....	36	33	....	....	....	....	.35	....	.35	....	2,200
Martin White, Nev.	1.15	1.10	2.00	1.20	1.80	....	....	....	....	....	....	....	1,700
Mexico, Cal	65	....	.77	.75	....	....	....	....	.70	....	6 0	....	100
Mt. Diablo, Nev	2.25	....	....	....	....	....	....	....	....	....	....	....	100
Navajo, Nev.	.75	....	....	....	....	....	....	....	....	....	....	....	300
Ontario, Ut.	....	.....	25 00	....	45 25	....	45.00	....	....	....	....	....	410
Ophir, Nev.	4 50	....	4 6	....	4.65	....	....	....	....	....	4 50	....	500
Osceola, Mich	....	....	44.88	....	....	....	....	....	....	....	....	....	10
Plymouth, Cal.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Quicksilver, Pref	41 00	40.88	41 00	....	41.00	....	41.00	....	29 50	....	40.50	....	850
" Com.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Quincy, Mich.	....	....	125½	....	....	....	....	....	....	....	....	....	20
Robinson Cons. Colo.	45	.....	.50	....	....	....	....	.50	....	....	....	....	1, 00
Savage, Nev.	4.35	.....	4.50	....	....	....	....	....	....	....	....	....	200
Sierra Nevada, Nev.	....	.....	3 60	....	....	....	....	....	....	....	....	....	200
Silver Cord	.30	.....	.30	....	....	....	....	....	....	....	.30	.27	2,100
Silver King	....	.....	.66	.55	.68	.65	.65	....	....	....	....	....	1,200
Silver Mg. of L. V.	....	.....	.67	....	....	....	....	....	....	....	....	....	7
Small Hopes, Colo.	....	.....	.90	....	....	....	....	....	....	....	.91	.90	1,900
Standard, Cal	.10	.09	$ 12	.10	.70	$ 09	....	....	....	....	....	....	2,37
Tamarack, Mich.	207½	....	....	....	....	....	210¾	....	....	....	....	....	20
Yellow Jacket, Nev	3 20	....	....	....	....	....	....	....	....	....	3 25	....	400

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	July 12 H.	July 12 L.	July 14 H.	July 14 L.	July 15. H.	July 15. L.	July 16 H.	July 16 L.	July 17 H.	July 17 L.	July 18 H.	July 18 L.	SALES.
Alloues, Mich	9.25	....	....	....	....	....	....	....	....	....	....	....	100
Alta, Nev.	1.35	....	....	....	....	....	....	....	....	....	1.35	....	400
Andes, Nev.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Amador, Cal.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Astoria, Cal.	.04	.03	04	....	.05	....	....	....	....	....	.05	....	4,900
Bechtel	.28	.22	.24	....	25	....	.25	....	....	....	....	....	500
Best & Belcher, Nev.	4.00	....	4.10	....	....	....	....	....	....	....	....	....	300
Bonanza King, Cal.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Brunswick, Cal.	.75	....	.75	....	.75	.70	.75	.70	.76	.73	.74	.72	16,000
Bullion, Nev.	3 60	....	....	....	....	....	....	....	3 50	....	3 40	....	300
Butte & Bost, Mont.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Castle Creek, Id.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Challar, Nev	4.10	....	....	....	....	....	....	....	....	....	....	....	100
Col & Beaver, Id.	....	.....	....	.03	....	....	....	....	....	....	....	....	3,500
Commonw. Nev	....	.....	....	....	....	....	....	....	....	....	3.20	....	100
Comstock T., Nev.	....	.....	....	....	....	....	....	....	....	....	....	....	1,9 0
" bonds.	....	.....	....	....	....	....	....	....	....	....	.24	....	1,000
" scrip	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Con Imperial, Nev.	.55	....	.55	....	....	....	....	....	....	....	....	....	700
Denver City, Colo.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
El Plata, Rep of Col	.91	....	....	....	....	....	....	....	.90	.85	.85	....	400
Exchequer	1 25	....	....	....	....	....	....	....	....	....	....	....	100
Huron, Mich.	29 75	....	....	....	....	....	....	....	....	....	....	....	300
Julia, Nev.	.50	....	.45	....	9.25	....	....	....	....	....	....	....	1,400
Justice Nev.	1 90	....	....	....	.50	....	45	....	....	....	....	....	200
Kingst'n & Pemb'ke	70	....	....	....	....	....	....	....	1 85	....	.50	....	100
Kossuth	14	....	.15	....	....	....	....	....	....	....	....	....	900
Larkspur, Colo.	.07	....	....	....	....	....	....	....	....	....	....	....	2,000
Lee Basin, Colo.	....	.....	....	....	....	....	....	....	....	....	....	....	100
Mexican Nev	3.30	....	....	....	....	....	....	....	07	.06	....	....	.....
Minn Iron Co., Mich	86 0	....	86 50	....	....	....	....	....	3.10	....	3.35	....	3 0
Monitor	....	.....	....	....	....	....	....	....	....	....	....	....	100
Mutual Sm & M. Co	1 55	....	1 60	....	1.60	....	1.65	....	1.70	....	1.70	....	2,300
Nevada Queen, Nev.	90	....	....	....	....	....	....	....	....	....	....	....	100
N. Com'n'w'th, Nev.	2 85	....	....	....	....	....	....	....	....	....	....	....	100
Occidental, Nev.	....	.....	1 80	....	....	....	1.70	....	1.50	....	1.70	1 65	700
Oriental & Mil., Nev	07	.06	....	....	....	....	....	....	....	....	....	....	1,500
Overman, Nev.	....	.....	3.00	....	....	....	....	....	....	....	....	....	100
Phœnix of Ariz.	1 30	1.26	1.35	1 30	1 40	1 30	1 40	1.35	1.35	1.30	1 35	1.30	12,900
Potosi, Nev	8 60	....	....	....	....	....	....	....	....	....	....	....	100
Rappahannock, Va	.07	.03	.06	....	.07	.06	....	....	.07	....	....	....	600
Santa Fe, Ariz	....	.....	....	....	....	....	....	....	.70	....	....	....	700
Santiago, U. S. C.	....	.....	.50	....	.50	....	....	....	....	....	....	....	300
S. Sebastian	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Scorpion	.40	.35	.45	....	....	....	....	....	....	....	....	....	500
Shoshone	.02	....	....	....	....	....	....	....	....	....	....	....	1,000
Silver Queen	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Sutro Tunnel, Nev.	.08	....	....	....	....	....	....	....	....	....	.11	.10	1,000
" Trust Cert.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Sutter Creek, Cal.	1 00	.95	.98	.96	.98	....	1.00	....	.99	.98	.98	.97	4,600
Tioga, Cal.	.20	.18	....	....	....	....	.18	....	....	....	....	....	700
Union Cons., Nev.	....	.....	....	....	1 25	....	....	....	1 25	....	1.15	....	900
Utah, Nev.	1 15	....	....	....	....	....	....	....	....	....	....	....	.....

* Ex dividend. †Dealt in at the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 57,623. Non-dividend shares sold 65,400. Total New York, 123,023.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	July 11.		July 12.		July 14.		July 15		July 16.		July 17.		SALES.
Atlantic, Mich.	25 50	25.00	25.00	....	25.00	....	24 50	24 25	24.50	24.25	24.50	....	793
Bodie, Cal.	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Bonanza Developm't	....	.....	....	.....	....	....	....	....	90	....	....	....	25
Bost. & Mont., Mont.	63 75	63 25	63 50	.....	64.50	63.50	64 75	64 00	64 75	64 00	63 75	63 50	2,009
Breece, Colo.	.40	....	.42½	....	.43½	.43	60	.4	.6	.40	.62½	.60	6,265
Calumet & Hecla, Mich.	306¼	304	308	304	310	307	....	....	....	....	3.8	305	105
Catalpa, Colo.	....	....	....	....	.37½	35	....	....	....	....	....	....	150
Central, Mich.	....	....	.50	....	....	....	....	....	....	....	....	....	.....
Chrysolite, Colo	....	....	.06	.55	.68	.65	.65	....	....	....	....	....	.....
Con. Cal. & Va., Nev.	.....	....	....	....	....	....	....	....	....	....	....	....	.....
Dunkin, Colo.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Eureka, Nev.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Franklin, Mich.	24 00	23.50	....	....	23.25	23.00	23.85	23.50	23.88	23 50	24.00	23.50	874
Freeland, Col.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Kearsarge	28.00	27.00	27.50	27.00	28.00	25.25	26.00	25.00	26.00	25 50	27.50	....	2,332
Little Chief, Colo	....	....	....	.....	....	....	....	....	....	....	....	....	.....
Little Pittsburg, Colo.	....	....	....	.....	....	....	....	....	....	....	....	....	.....
Martin White, Nev.	....	....	....	.....	....	....	....	....	....	....	....	....	.....
Mouat n.	....	....	5 00	....	....	....	....	....	....	....	....	....	250
Napa, Cal.	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Ontario, Utah	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Osceola, Mich.	45 00	44 38	44 50	....	45.00	44.00	44.50	....	44 50	....	45 5	44 75	1,250
Pewabic, Mich.	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Quincy, Mich.	121	....	121	120	....	....	125	....	125	....	126	125	372
Ridge, Mich.	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Sierra Nev., Nev.	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Silver King	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Stormont, Utah	....	.....	....	.....	....	....	....	....	....	....	....	....	.....
Tamarack, Mich.	207	205	208	206	207½	207	208½	....	208½	....	....	....	324

NAME OF COMPANY	July 11	July 12.	July 14.	July 15	July 16.	July 17	SALES.
Alloues, Mich.	9 50	9.38	9.38	9.00	8.63	9.00	8 75	3,790
Arnold, Mich.	1.75	1 63	2.00	....	....	....	....	150
Aztec, Mich.	....	.....	....	....	....	....	....	.....
Bowman S., Nev.	....	.....	....	....	....	....	....	.....
Butte & Bost., Mont	23.00	22 00	25 00	24 00	23.00	24 75	23 00	23 75	3.00	....	....	1,757
Centennial, Mich.	38.50	37.50	38.00	37.50	37.0	38.50	36.00	....	36 00	....	36 00	1,575
Contentment, Mich.	....	.....	....	....	....	....	....	....	....	....	....	.....
Copper Falls, Mich.	....	.....	....	....	....	....	....	....	....	....	....	.....
Crescent, Colo.	....	.....	....	....	....	....	....	....	....	....	....	.....
Dana, Mich	....	.....	....	....	....	....	....	....	....	....	....	.....
Don Enrique, N. M.	....	.....	....	....	....	....	....	....	....	....	....	.....
El Cristo, S. A.	....	.....	....	....	....	....	....	....	....	....	....	.....
Hanover, Mich.	....	.....	....	....	....	....	....	....	....	....	....	.....
Humboldt, Mich.	....	.....	....	....	....	....	....	....	....	....	....	.....
Hungarian, Mich.	....	.....	....	....	....	....	....	....	....	....	....	.....
Huron, Mich.	9 25	9.00	9.00	....	9.00	....	8.94	8.50	8.94	8.50	....	....	605
Mesnard, Mich.	....	.....	....	....	....	....	....	....	....	....	1.75	2 00	600
National, Mich.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Native, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Original & M., Nev.	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Phœnix	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Pontiac	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Rockland	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Santa Fe, N. Mex.	.70	.....	.70	....	70	....	....	....	....	....	.70	....	1,100
Shoshone Idaho	....	.....	....	....	....	....	....	....	....	....	....	....	.....
South Side, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Star	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Tecumseh Mg. Co.	7.88	....	....	....	....	....	....	....	....	....	7.50	....	100
Washington, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....

† Assessment paid. Boston: Dividend shares sold, 14,749. Non-dividend shares sold, 8,977 Total Boston, 23,726

COAL STOCKS.

NAME OF COMPANY.	Par v. l of sh'rs.	July 12 H.	July 12 L.	July 14. H.	July 14. L.	July 15. H.	July 15. L.	July 16 H.	July 16 L.	July 17. H.	July 17. L.	July 18. H.	July 18. L.	Sales.
American Coal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria Iron.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cameron Coal & Iron Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ches. & O. RR.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chic. & Ind. Coal RR.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col., C. & I	100	.....	.....	51½	.....	.....	.....	.....	.....	52¼	51½	52	52¾	1,150
Col. & Hocking C. I	100	31½	.....	.....	.....	.....	.....	33	32	32¾	32½	.....	.....	8,135
Consolidation Coal.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del. & H. C.	100	.....	.....	169¼	.....	169¾	.....	169	.....	169¼	169	.....	.....	770
D., L. & W. RR.	50	148¼	147¼	148	147¼	148¼	147¾	148⅝	147½	148⅝	148½	148⅝	148¾	45,745
Hocking Valley	100	30	28⅞	30⅝	29⅞	30¼	25⅝	30½	29¾	30¾	30	31⅛	30¾	13,8 4
Hunt. & Broad Top	....	22½	.....	.....	.....	.....	.....	22½	.....	.....	.....	.....	.....	1 0 0
Do. pref	....	49⅜	.....	49¼	48⅞	49¼	.....	49¼	49	49¼	.....	.....	.....	660
Illinois Coal & Coke Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh C. & N.	50	52¼	.....	52⅜	.....	52½	.....	52½	52¼	52	.....	.....	.....	252
Lehigh Valley RR.	50	52⅞	52¾	52⅜	.....	52⅛	52¾	52⅝	52⅜	52⅝	.....	.....	.....	1,076
Lehigh & Wilkesb. Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mahoning Coal.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall Con. Coal.	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	200
Maryland Coa	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morris & Essex.	100	.....	.....	.....	.....	.....	.....	.....	.....	153⅝	.....	.....	.....	100
New Central Coal.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. J. C. R. R.	100	.....	.....	.....	.....	124	.....	.....	.....	.....	.....	125	.....	110
N. Y. & S. Coal.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y., Susq. & Western	100	8	.....	.....	.....	.....	.....	.....	.....	7¾	.....	.....	.....	300
Do. pref.	100	.....	.....	.....	.....	.....	32¾	.....	32½	32¾	.....	.....	.....	146
N. Y. & Perry C. & I.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk & Western R.R.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21½	.....	200
Do. pref.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn. Coal.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn. RR.	50	53⅛	.....	53⅛	53⅜	53⅝	53⅛	53⅛	.....	53⅝	.....	21⅝	.....	1,646
*Ph. & R. RR.	.....	46¾	46⅛	46⅝	46	46⅜	46⅛	46¼	45⅝	46⅛	45⅝	46	45⅝	57,747
Sunday Creek Coal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee C. & I. Co.	.....	51¾	51½	52	50¾	.....	.....	50¾	50¼	.....	.....	50½	.....	1,100
Do. pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westmoreland Coal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

**Sales in New York, 30,450; in Philadelphia, 27,097. Total sales, 134,253.

San Francisco Mining Stock Quotations.

COMPANY	CLOSING QUOTATIONS. July 11 *	July 12.	July 14	July 15.	July 16.	July 17.
Alpha	.....	1.30	.....	.....	.....	.....
Alta	.....	1.30	1.20	.....	1.20	1.25
Belcher	.....	.....	.....	.....	.....	.....
Belle Isle	.....	.....	1.40	.....	1.30	1.05
Best & Bel.	.....	3.80	4.00	.....	4.10	4.10
Bodie	.....	.75	1.00	.....	1.00	1.15
Bulwer	.....	.30	.30	.....	.25	.25
Challar	.....	3 90	3.80	.....	3.80	4.00
C'm'weal'h	.....	.....	3.25	.....	3.25	.....
Con. C. & V	.....	4.45	4 30	.....	4.40	4.25
Con. Pac.	.....	.....	.....	.....	.....	.....
Crown Pt.	.....	2.95	2.95	.....	2.90	3.00
Eureka C.	.....	.....	.....	.....	.....	.....
Gould & C.	.....	2.70	2.80	.....	2.90	2.90
Grd. Prize.	.....	.....	.....	.....	.....	.....
Hale & N.	.....	3.05	3.25	.....	3.05	3.10
M. White.	.....	.....	.....	.....	.....	.....
Mexican	.....	3.30	3.35	.....	3.30	3.30
Mono.	.....	.65	.60	.....	.60	.60
Mt. Diablo	.....	.....	2 10	.....	.....	.....
Navajo	.....	.65	.75	.....	.70	.70
Nev. Queen	.....	.....	.....	.....	.80	.75
N. Belle I	.....	.....	1.50	.....	1.30	.....
Occidental	.....	.....	.....	.....	.....	.....
Ophir.	.....	4.35	4.50	.....	4.35	4.35
Potosi.	.....	7.62	7.63	.....	7.75	8.25
Savage	.....	4.35	4.65	.....	4.70	4.45
Sierra Nev	.....	3.60	3.40	.....	3.50	3.40
Union Con.	.....	2.85	3.00	.....	2.85	2.95
Utah	.....	1.10	1.05	.....	1.05	1.05
Yellow Jkt	.....	3.05	3.15	.....	3.25	3.20

* Through an accident we were unable to get prices for the above dates.

STOCK MARKET QUOTATIONS.

Baltimore, Md.

COMPANY.	Bid. L. H.	Asked. L. H.
Atlantic Coal	$ 95@$1.00	$1.25@$1.50
Balt. & N. C.	....	10
Big Vein Coal	....	....
Conrad Hill	....	10
Cons. Coal	....	27
Diamond Tunnel	....	....
George's Crk. C.	1.10	1.25
Lake Chrome	....	....
Maryland & Charlotte	....	....
North State	10	....
Silver Valley	45	55

Prices bid and asked, lowest and highest, during the week ending July 17.

Birmingham, Ala.

COMPANY.	Bid. L. H.	Asked. L. H.
Ala. R. Mill Co.	....	$60
*Alice Furnace	$103	....
Anna Howe G. Mg. Co.	$⅝	$¾
Bessmer Land.	....	$3 ¼
Bir. Mg. & M'g.	....	$83
Cahaba Coal Mg. Co.	....	$70
Camille Gold Mg. Co.	$½	....
De Bardeleben C. & I. Co.	....	$76
Decat. L. Imp.	$14¼	$15⅛
DecaturMin. L.	....	$22¾
Ensley Land	$10	....
*Eureka	**$99½	....
Florence L. & Mg. Co.	$20	$22
Gadsen Land	$⅝	$63⅜
Hecla Coal Co.	$5	....
Hen. S. & M. Co	$75	$79
Mag-Ellen	$100	....
Mary Lee C. & R. Co.	$20	....
Sheffield C & I. Co.	$53½	$56
Sloss I. & S.	$44	....
†Sloss I. & S.	$94	$96
††Sloss I. & S.	....	$78
Tuscaloose C. I. & L. Co.	$24	$27
Tenn. C. & I. Co.	....	....
" pref.	$100	$105
Woodstock I. Co.	....	$41

Prices, highest and lowest, bid and asked during week ending July 14.

* Bonds. † First mortgage. †† Second mortgage. ** Without interest.

Pittsburg, Pa. July 17.

COMPANY.	B.	A.	Closing
Allegheny Gas Co.	....	....	....
Bridgewater Gas Co.	$52.00	$60.00	$60.00
Chartiers Val. Gas	39.00	41.50	41.00
Columbia Oil Co.	2.00	2.75	2.13
Consolidated Gas Co.	....	....	....
East End E. Light Co.	60.00	....	60.00
East End Gas Co	....	....	....
Forest Oil	....	....	....
Hazlewood Oil Co.	....	....	....
La Noria Mining	.18	.20	....
Luster Mg. Co.	17.00	18.00	17.88
Manufacturers Gas Co.	14.50	16.50	15.00
Nat. Gas Co. of W. Va	....	....	....
N. Y. & Clev. Gas Coal.	31.50	....	31.50
Ohio Valley Gas.	10.00	....	10.00
Mansfield C. & C. Co.	....	....	....
Pennsylvania Gas	....	14.00	14.00
People's Natural Gas.	....	....	....
People's N. G. & P. Co.	....	15.63	15.63
Philadelphia Co.	30.88	31.25	31.00
Pine Run Gas Co.	....	....	....
Pittsburg Gas	....	....	....
Silverton Mg. Co.	....	....	....
South Side Gas.	....	....	....
Tuna Oil Co.	....	....	....
Union Gas.	....	....	....
Washington Oil Co.	90.00	....	90.00
Wilhouse Brake Co.	....	....	....
Wilhouse A. B. Co.	116.00	118.50	118.50
Wilhouse E Light.	36.00	38.88	36.38
Wilmoreland & Camb.	....	....	....
Wheeling Gas.	18.63	20.00	19.75
Yankee Girl Mg	3.00	5.00	5.00

* Actual selling price.

		July 17.
Penn. Gas Co.	35 shs.	@$14
Philadelphia Co.	15 "	@$30½
West. Electric	100 "	$37

St. Louis. July 16.

CLOSING PRICES.

COMPANY.	Bid.	Asked.
Adams, Colo.	$1.00	....
American & Nettie	1.95	$1.97½
Astec, N. Mex.	....	.25
Bi-Metallic	30 00	35.00
Buckskin	.05¼	....
Central Silver	.13¼	.14
Cleveland, Colo.	.03½	.04
Cleveland & An'r.	.15	.20
Gold King	.02	....
Granite Mountain, Mont.	46.25	46.75
Hope, Mont.	2.00	....
Ivanhoe, Colo.	.08	.10
Ingram	.30	.60
La Union	.09½	.10
Little Albert	.33¾	.35
Montrose Placer, Colo.	.40	.41¼
Major Budd, Mont.	.06	.08
Mexican Imp., Mex.	.10	.17½
Mickey Breen.	1.27½	1.35
Mountain Key	.25	.45
Pat Murphy, Colo.	.13½	.14
Silver Age, Colo.	1.52½	1.70
Small Hopes, Colo.	.87½	.92½
West Granite, Mont.	1.05	1.10
Wire Patch	.15	.17½
Yuma, Ariz.	.42½	.50

Trust Stocks. July 18.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

CERTIFICATES.

Am. Cotton Oil. Tr. Repts.	$28 @$28¾
Cattle Trust	14 @ 16
Distillers' & Cattle Feeders'.	45 @ 45½
Linseed Oil	51 @ 52
National Lead	21 @ 21½
Standard Oil	165 @169
Sugar Refineries.	76½@ 76¼

Sales at the New York Stock Exchange week ending July 11:

	Sales.	Price H.	Price L.
*American Cotton Oil	1,000	29¼	28½
National Lead	12,425	21⅝	20⅝
Sugar	41,248	76½	71⅜

*Trust receipts.

Foreign Quotations.

London.

COMPANY.	Highest.	Lowest.
Almada, Mex.	1s. 9d.	1s. 3d
Amador, Cal.	£1 1-16	£.5-16
Appalachian, N. C.	9d.	6d.
Canadian Phos, Canada.	£⅛	£¼
Carlisle, N. Mex	3s. 6d.	3s.
Colorado, Colo.	4s.	3s.
Comstock, Utah	....	....
Condova	....	....
Cons. Esmeralda, Nev.	2s. 9d.	2s. 3d.
Denver Gold, Colo.	9d.	3d.
Dickens Custer, Idaho.	1s. 6d.	1s.
East Arevalo, Idaho.	2s.	1s.
Eberhardt, Nev	....	....
El Callao, Venezuela	£2⅜	£2⅛
Elmore, Idaho	2s. 3d.	1s. 9d.
Empire, Mont	1s. 3d.	9d.
Garfield, Nev.	1s 9d.	1s. 3d.
Jay Hawk Mont	3s.	2s.
Josephine, Cal	1s. 6d.	1s.
Kohinoor, Colo.	2s. 3d.	1s. 9d.
La Luz, Mex.	9d.	3d.
La Valera, Mexico	1os.	10s.
Montana Lt., Mont	27s.	26s.
New California, Colo.	8s.	7s. 6d.
New Consolidated	9d.	3d.
New Eberhardt, Nev.	1s. 3d.	9d.
New Emma, S., Utah	1s. 6d.	1s.
New Flagstaff, Utah	4s.	3s.
Newfoundland, N. F.	3s. 6d.	2d
N Gold Hill, N. C.	1s 9d.	1s. 3d.
New Guston, Colo.	£5 15-16	£5 13-16
New Hoover Hill, N. C.	1s. 3d.	9d.
Old Lout, Colo.	£⅜	£⅝
Palmarejo, Mex	16s	15s.
Pinos Altos, Mex.	£⅜	£⅛
Pittsburg Cons., Nev.	£ 1-16	£¼
Richmond Con., Nev.	£1¼	£1
Ruby & Dunderberg, Nev	1s.	9d.
Sam Christan, N. C.	1s. 3d.	9d.
Sierra Buttes Cal.	4s.	3s.
" Plumas Eur.	£15-16	£13-16
Sonora Mex	1s.	6d.
Stanly, N. C.	....	....
United Mexican, Mex.	7s.	6s.
U. S. Placer, Colo.	2s. 3d.	1s. 9d.
Viola Lt., Idaho	2s.	1s. 6d.

Highest and lowest prices during the week ending July 5.

Paris.

	Francs.
Belmez, Spain	763.05
Callao, Venez.	62 50
Callao Bs. Venez.	6 50
East Oregon, Ore.	7.50
Forest Hill Divide, Cal	100.00
Golden River, Cal	450.00
" " parts	70 00
Lexington, Mont	140.00
" parts	4.25
Ouray, Colo.	...
Rio Tinto, Spain	527.50
Tharsis, Spain	150.00

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Acid—Acetic, ℔ 100 lbs. $1.75@$2.00
Muriatic, 18°, ℔ 100 lbs. 1.00@1.50
Muriatic, 20°, ℔ 100 lbs. 1.12½@1 75
Muriatic, 22° ℔ 100 lbs. 1.37½@2.00
Nitric, 36°, ℔ 100 lbs. 4.00@4.25
Nitric, 42°, ℔ 100 lbs. 6.00@6.25
Oxalic, ℔ 100 lbs. .6.50@10.50
Sulphuric, 60°, ℔ 100 lbs. 80@1.25
Sulphuric, 66°, ℔ 100 lbs. 1.00@1.75

Alkali—
Refined, 48 p. c. @2¾
Refined, 58° 2¾@3

Alum—Lump, ℔ lb. 1¾
Ground, ℔ lb. 1¾@2
Lump ℔ ton, Liverpool £4 17 6
Sulphate of Alumina, ℔ ton. £4 10

Aqua Ammonia—18°, ℔ lb. 4¾
20°, ℔ lb. 6
22°, ℔ lb. 6@7
26°, ℔ lb. 10@11

Ammonia—Sul., ℔ 100 lbs. 3.15
Carb, per lb. 7½@8½

Arsenic—White, powdered, ℔ lb. 3½@3½
Red. ℔ lb 5½@6¾
White, at Plymouth, ℔ ton. £12 2 6d.

Asbestos—Am., p. ton. $50@$300
Italian, p. ton. c. i. f. L'pool. £18@£26

Asphaltum—P. ton 13.00
Prime Cuban, ℔ lb. 4½@5½c
Hard Cuban, ℔ ton. $28.00
Trinidad, refined, ℔ ton. $30.00

Barytes—Sulph., Am. prime white 17@20
Sulph., foreign, floated, p. ton 19½@21.50
Sulph., off color, p. ton 11.50@14.00
Carb., lump, f.o.b. L'pool, ton £6
No. 1, casks, Runcorn " £4 10 0
No 2, bags, Runcorn " 3 15 0

Bleach—Over 35 p.c., ℔ lb. 2@2½

Borax—Refined, ℔ lb. 9½@9⅝
Concentrated 7¾@8⅛
Refined at Liverpool, ℔ ton. £29

Brimstone—*See Sulphur.*

Bromine—℔ lb. 37@38

Chalk—℔ ton 1.75
Precipitated, ℔ lb. 4¾@5

China Clay—English, ℔ ton 13.50@18.50
Southern, ℔ ton 13.50

Chrome Yellow—℔ lb. 10@25

Cobalt—Oxide, ℔ lb. 2.60@2.90

Copper Sulph. English Wks, ton £20@£21

Copperas—Common, ℔ 100 lbs. 70
Best, ℔ 100 lbs. 75@1.00
Liverpool, ℔ ton, in casks £1 15s.

Cream of Tartar—Am. 99% 22½
Powdered, 99 p c. 23

Emery—Grain, ℔ lb. 4½@5
Flour, ℔ lb 2¾@3½

Feldspar—Ground, ℔ ton. 15.00

Fuller's Earth—Lump, ℔ bbl. .90@95
Powdered, ℔ lb. 1¾@2

Gypsum—Calcined, ℔ bbl. 1.25@1.50

Iodine—Resublimed 2.75

Kainit—℔ ton $9.25@19.75

Kaolin—*See China Clay.*

Lead—Red, ℔ lb. 6¾@9
White, American, in oil, ℔ lb. 6¾@7¼
White, English, ℔ lb 8½@8¾
Acetate, or sugar of, white 12@13
Lime Acetate—Amer. Brown. .95@1.00
" Gray 1.75@1.87½

Litharge—Powdered, ℔ lb. 6½@6¾
English flake, ℔ lb. 9@9½

Magnesite—Greek, ℔ ton. 20.00

Manganese—Crude, per unit. .23@.28
Oxide, ground, per lb 2½@6½

Mercuric-Chloride — (*Corrosive Sublimate*) ℔ lb. 70@72

Mineral Wool —℔ lb. 2

Mica—In sheets according to size, 1st quality, ℔ lb. .25@$6.00

Ochre—Yellow, "B. F.," ℔ ton, f.o.b. mill 30.00
"J. F. L. S.," ℔ lb. ex dock 2½

Phosphate Rock—S. Carolina, per ton, o. b. Charleston. 5.75@7.00
Ground, ex vessel New York. 11.00
Canadian Apatite, lump, f. o. b. at Montreal, ℔ ton. 16.00

Phosphorus—℔ lb. 70@75

Plumbago—Ceylon, ℔ lb. 4@5
American, ℔ lb. 5@7

Potassium—Cyanide, ℔ lb. .39@40
Bromide, ℔ lb. 33
Chlorate, ℔ lb. 13@10
Carb. ℔ lb. 4.70@5.50
Caustic, ℔ lb. 7½@8
Iodide. 2.65@2.70
Muriate, ℔ 100 lbs. 1.77½@1.80
Nitrate, refined, ℔ lb. 6@8
Bichromate, ℔ lb. 10½@11
Sulphate, ℔ 100 lbs. 2.30@2.35
Yellow Prussiate, ℔ lb. 17½@18
Red Prussiate, ℔ lb. 42@45

Pumice Stone—Select lumps, lb. 3¼
Original cks., ℔ lb. 1¾@2
Powdered, pure, ℔ lb. 2¼@2½

Pyrites—Non cupreous, p. units 10d

Quartz—Ground, ℔ ton. 14.00@16.00

Rotten Stone—Powdered, ℔ lb. 3¼@3½
Lump, ℔ lb. 6@10

Salt—Liverpool, ground ℔ sack. 75@80
Turk's Island, ℔ bush. 25@28

Salt Cake—℔ lb. 60@62½

Saltpeter—Crude, ℔ lb. 5¼@5½
Refined, ℔ lb. 6@8

Soda Ash—Carb., 48 @ 100 lbs. 2¾
Caustic, 48 @ 2¼@2½
Soda Caustic, 60% 3.25@3.35
" 70% 3.00
" 74-76% 2¾

Sal, English, ℔ 100 lbs. 1½@ ⅝
Sal, American, ℔ 100 lbs .9
Nitrate, 100 lbs 1.70

Strontium—Nitrate ℔ lb. 9@9½

Sulphur—Roll, ℔ lb. 1¾
Flour, ℔ lb 2@
Crude Brimstone, 2s, ℔ ton. 19.00@19.29
Crude Brimstone, 3ds, ℔ ton. 18.50@18.70

Talc—Ground French, ℔ lb. 1¼@1½
Domestic, ℔ ton $18@$20
c. i. f. Liverpool, ℔ ton. £4 5

Vermillion—American, ℔ lb. 61
English, ℔ lb. 82@85

Vitriol—(Blue), Ordinary, ℔ lb. 5½@5⅝
Extra, ℔ lb. 7

Zinc Oxide—Am., Dry, ℔ lb. 4½
Antwerp, Red Seal, ℔ lb. 6@6½
Paris, Red Seal, ℔ lb. 6½@7
* Spot.

THE RARER METALS.

Aluminum—(Metallic), ℔ lb. $2.@$2.50
Sheet, per lb. 2.50

Arsenic—(Metallic). per lb. .40

Barium—(Metallic), per gram. $4.00

Bismuth—(Metallic), per lb. 2.75

Cadmium—(Metallic), per lb. 1.00

Calcium—(Metallic), per gram. 10.00

Cerium—(Metallic), per gram. 7.50

Chromium—(Metallic), per gram 1.00

Cobalt—(Metallic), per lb. 6.00

Didymium—(Metallic), per gram 9.00

Erbium—(Metallic), per gram. 7.50

Gallium—(Metallic), per gram. 140.00

Glucinum—(Metallic) per gram. 12.00

Indium—(Metallic), per gram. 9.00

Iridium—(Metallic), per oz. 7.00

Lanthanum—(Metallic), per gr. 10.00

Lithium—(Metallic), per gram. 10.00

Magnesium—Per lb. 4.50

Manganese—Metallic, per lb. 1.10
Chem. pure, per oz. 10.00

Molybdenum—(Metallic), per gm. .50

Niobium—(Metallic), per gram. .50

Osmium—(Metallic), per oz. 65.00

Palladium—(Metallic), per oz. 35.00

Platinum—(Metallic), per oz. 9.00

Potassium—Metallic, per lb. 28.00

Rhodium—(Metallic), per gram. 5.00

Ruthenium—(Metallic), per gm. 5.50

Rubidium—(Metallic), per gram 2.00

Selenium—(Metallic), per oz. 1.80

Sodium—(Metallic) per lb. 2.50

Strontium—(Metallic), per gm. .60

Tantalium—(Metallic) per gram 9.00

Telurium—(Metallic) per lb. 5.00

Thallium—(Metallic) per gram. .25

Titanium—(Metallic) per gram. 2.25

Thorium—(Metallic) per gram. 17.00

Tungsten—(Metallic) per oz. 2.25

Uranium—(Metallic), per lb. 5.00

Vanadium—(Metallic), per gm. 22.00

Yttrium—(Metallic), per gram. 9.00

Zirconium—(Metallic), per oz. 65.00

BUILDING MATERIAL.

Bricks—Pale, ℔ 1,000 3 50@3.75
Jerseys, ℔ 1,000 5.50@7.00
Up Rivers, ℔ 1000 6 75@7.00
Haverstraw seconds, ℔ 1000 6.50@7.00
Haverstraw firsts ℔ 1,000 7.00@7.75
Fronts, nominal, ℔ 1000.
Croton 14.00@16.00
Wilmington 20.00@21.00
Philadelphia @22.00
Trenton @22.00
Baltimore

Building Stone—Amherst freestone, ℔ cu. ft. 95@1.00
Brownstone, ℔ cu. ft. 1.00@1.35
Granite, rough, ℔ cu. ft. .45@1.25
Granite, Scotch ℔ cu ft. 1.00@1.15

Cement—Rosendale, ℔ bbl .85@1.10
Portland, American, ℔ bbl. 2 15@2.45
Portland, foreign, ℔ bbl. 2.30@2.40
Portland, " special brands. 2.45@2.75
Roman, ℔ bbl. 2.65@2.85
Keene's coarse, ℔ bbl. 4.50@5.50
Keene's fine, ℔ bbl. 7.00@8.25

Slate—Purple and green roofing, ℔ 100 ft. 7.00@7.50
Red roofing, ℔ 100 sq. ft. 12.00
Black, roofing, ℔ 100 sq. ft. 4.25@5.00

Lime—Rockland, common ℔ bbl. 1.00
Rockland, finishing, ℔ bbl. 1.20
St. John, com. and finish, ℔ bbl. .90@.95
Glens Falls, com. and fin., ℔ bbl. .85@1.10

Labor—Ordinary, ℔ day 1.50@2.00
Masons, ℔ day 4.00
Plasterers, ℔ day 4.00
Carpenters, ℔ day 3.50
Plumbers, ℔ day 3.50
Painters, ℔ day 2.50@3.50
Stonesetters, ℔ day 3.50@4.00
Tilelayers, ℔ day 3.50@4.50
Bricklayers, ℔ day 4.00

THE ENGINEERING AND MINING JOURNAL will thank any one who will indicate any other articles which might with advantage be quoted in these tables or who will correct any errors which may be found in these quotations.